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Original Communications.

MEDITERRANEAN FEVER IN SOUTH AFRICA.

By Lieutenant-Colonel C. BIRT.
Royal Army Medical Corps.

Dr. P. D. Strachan, of Philippolis, Orange River Colony, recorded in the *South African Medical Record*, August 15th, 1904, and the *British Medical Journal*, July 15th, 1905, seventy-two cases of prolonged pyrexia which came under his care during a period of eighteen months. He considered they presented the symptoms of Mediterranean fever, and to confirm his diagnosis he sent blood from thirty-four to the Government laboratories of Cape Town and Grahamstown. Twenty-five reacted with the *Micrococcus melitensis* in dilutions of 1 in 10 to 1 in 50.

The existence of Mediterranean fever as a disease endemic in South Africa, is of much interest. Colonel Bruce was shown a case at Kimberley in 1901, which, in his opinion, was one of this malady (Journal of the Royal Army Medical Corps, volume ii., page 485), but there was no indication that it had spread beyond this district. During the last five years at Harrismith, Bloemfontein, and Pretoria, none of the many instances of fever in the wards of the military hospitals have borne the aspect or followed the course of Malta fever. Moreover, the clumping reactions of the bloods of febrile cases of doubtful type have been tested with the *M. melitensis*, and have uniformly given negative results when a reliable emulsion has been employed. The only exceptions have been those of cases imported from the Mediterranean.

Dr. Strachan reports that his reactions were positive in dilutions of the serum of 1 in 10 to 1 in 50. The limit of dilution in which clumping was manifest does not appear to have been reached. It was with this object that I entered into communication with Dr. Strachan. He, with great trouble and labour, has collected samples of blood from a large number of those whom he had diagnosed as suffering from this infection, and has been kind enough to send them to the Army Medical Services Laboratory, Pretoria, with a history of each case.

It is well, first of all, to make a few remarks on the subject of agglutination of the *M. melitensis*. It is common knowledge of those who have had an extended experience with this microbe, that cultures far removed from the human body in point of time become very sensitive to normal agglutinins present in the blood of men and animals. An oversight of this fact has led astray more than one observer, either by wrongly pronouncing a case to be one of Mediterranean fever, or of discounting the worth of the test. Thus F. Konrich ("*Untersuchungen über die Agglutination des Micrococcus melitensis*," *Zeitschrift für Hygiene und Infectionskrankheiten*, Bd. xlvi., p. 261) doubts the value of the serum diagnosis in this fever because he found that the blood of individuals who had never been attacked clumped his cultures in a 500-fold dilution.

Captain G. Lamb and I (*Lancet*, September 9th, 1899) examined the serum of fifty healthy people, and of one hundred patients who were suffering from various ailments. We used emulsions of a recently isolated culture. In none of these instances did we observe a complete reaction in a dilution of 1 in 10, nor a trace in 1 in 20. We therefore inferred that a complete reaction in 1 in 10 and over, implied Mediterranean fever past or present. All of forty-four cases in the course of the fever answered to the test. The average maximum dilution for a complete reaction was between 600 and 700, while traces of agglutination were noticeable in 1,200 to 1,400 dilutions of the serum. We also investigated the condition in sixty-eight persons after recovery from Mediterranean fever. In twenty-seven examined within six months of their convalescence, the average maximum serum dilution in which sedimentation was present was 350 fold. In eighteen convalescent six to twelve months, the value was 250. The serum of seven from one to two years after their illness agglutinated when diluted 100 times. In one instance we noticed the characteristic property of the blood was still evident seven years after the malady. It is

therefore obvious that, with due care, the serum test is an important method of recognising Malta fever in its course, or after recovery.

The following reactions were given by specimens of blood collected by Dr. Strachan in August, September and October of last year:—

Cases Examined during the Pyrexia—

(1) Fever for the last nine months. Pains in back and thighs, emaciation. A *M. melitensis* emulsion gave the following reactions when examined macroscopically at the end of twenty-four hours:—10, 20, 60, 120, 200, complete; 300 well-marked; 1,000, 1,200, marked; 1,800, 4,800, *nil.*

(2) Daughter of above. Temperature about 102° F. to 103° F. for one month; swelling of the knee, anæmia:—10, 30, 90, 180, 200, 400, complete; 800 marked; 1,200, 2,000, *nil.*

(3) Fever for eight days:—10, 30, 90, 180, complete; 200 nearly complete; 1,000 trace; 2,000 *nil.*

Cases Examined after Recovery—

(4) Three months convalescent after a fever which lasted three months, accompanied with lumbago and sciatica:—10, 30, complete; 90 nearly complete; 300 trace; 900 *nil.*

(5) Four months convalescent after fever which lasted twenty months. Lumbago, sciatica, and anæmia were marked:—10, 30, complete; 100 well marked; 800 *nil.*

(6) Five months convalescent after a fever of six weeks' duration. Painful swelling of knee, which was not benefited by salicylates:—10, 20, complete; 40 traces; 100 *nil.*

(7) Five months convalescent after a fever which lasted six months; temperature sometimes 104° F. Pains in back and thighs were severe. His blood, examined during the course of the illness at Grahamstown, gave a positive reaction to the *M. melitensis*; negative with the typhoid bacillus:—10 complete; 30 nearly complete; 90 trace; 180 *nil.*

(8) Wife of the above. Five months convalescent after six months' fever, temperature 100° to 102° F., tongue clean, joint pains:—10, 30, 90, complete; 180 nearly complete.

(9) Six months convalescent after five months' fever. Sweating, swelling in the ankle joints, tongue clean:—10 complete; 30 nearly complete; 90 trace; 180 *nil.*

(10) Daughter of No. 8.—Six months convalescent after four months' fever. Her temperature was not very high, nor was she long confined to bed. Blood tested during the illness reacted to *M. melitensis*:—10, 20, cómplete; 40 trace; 80, 160, 320, 640, 1,280, *nil.*

(11) Sister of above. Six months convalescent after three months' fever. Temperature varied from 103° F. to 105° F.; swelling of the wrist and knee. Tongue clean and few general symptoms, notwithstanding the high pyrexia:—10, 30, 50, complete; 100, 200, nearly complete; 1,000 *nil.*

(12) Sister of above. Eight months convalescent after four months' fever. Temperature 100° F. to 101° F. Her blood during the illness agglutinated the *M. melitensis*:—10 complete; 30 traces; 90, 180, *nil.*

(13) Convalescent for one year after ten months' fever. Temperate 104° F. Severe pain and swelling of elbow and knee. Blood reacted during the illness with *M. melitensis*:—10 complete; 30 nearly complete; 90 *nil.*

(14) One year convalescent after fever, the relapses of which extended over two years. Reaction with *M. melitensis*, positive during the course of the illness:—10 complete; 30 trace; 90, 300, 600, *nil.*

(15) A brother of Nos. 11 and 12.—Thirteen months convalescent after four months' fever:—10 complete; 90 well marked; 180 *nil.*

(16) Sister of above. Fourteen months convalescent after a two months' fever. Pains in thighs severe:—10, 30, 120, complete; 200, 1,000, traces.

(17) Fifteen months convalescent after three months' fever. Lumbago, sciatica, and sweating, were the chief symptoms. Positive reaction during the course of the attack:—10 complete; 20, 30, nearly complete; 40 trace; 60, 80, 300, 600, *nil.*

(18) Eighteen months convalescent after three months' fever. Temperature 101° F. to 103° F. Pains in back were severe:—10 complete; 30 trace; 90, 300, 800, *nil.*

(19) Eighteen months convalescent after fever, relapses of which extended over eight months. Lumbago and sciatica:—10, 30, complete; 90 trace.

Controls.—Emulsion mixed with normal salt solution, *nil.* Emulsion mixed with 1 in 10 dilution of indifferent human serum from six sources, trace or *nil.* It follows, therefore, that in every case each sample of blood was derived from an individual who had been infected with the *M. melitensis*, and Dr. Strachan is to be congratulated on his brilliant diagnostic abilities.

His partner, Dr. D. Macrae, who served with the Royal Army Medical Corps for a long time during the war and after, and who has had a large experience of fevers in Bloemfontein, Fauresmith,

and Koffyfontein, has informed me that he has met with cases identical with Dr. Strachan's at both these latter places. Springfontein and Bethulie are also centres. All these towns are within a radius of seventy miles of Philippolis.

Dr. Strachan thinks it probable that infection has been conveyed by goats' milk, which is largely used in the district. He intends to send specimens of blood and milk of suspected animals to the Army Medical Services' Laboratory, Pretoria.

It seems probable that a common source of infection has been the cause of the numerous members of a family being attacked, and not mere personal contagion. I believe that no case has arisen in the wards of Netley Hospital during the long period it has received sufferers in all stages of this fever. On the other hand, six or seven have contracted the malady by accidental or intentional inoculation with the *M. melitensis* in the Pathological Laboratory there in the past eight years.

The conclusion to be drawn is that Mediterranean fever is now endemic in certain parts of the Orange River Colony, and its further invasion is to be apprehended. The agent in the causation of any doubtful fever should be carefully looked for by drawing off with a sterile anti-toxin syringe some 10 to 20 cc. of blood from a vein at the bend of the elbow and transferring to beakers of broth. If this is not feasible, serum reactions, properly controlled, should be undertaken.

THE WORKING EFFICIENCY OF SOME DISINFECTANTS.

By Major C. E. P. FOWLER.
Royal Army Medical Corps.

I have lately been carrying out some work on the possibility of forming a reliable system for the standardisation of disinfectants. Thinking that my findings of the values of some of the various disinfectants might be of interest to readers of the Journal, I therefore give a short *résumé* of the results. The methods employed have been those known as the "Garnet," the "Thread," and the "Drop."

I will give the results of experiments carried out by the "Drop" method only. It is necessary in the first place to draw a distinction between the classes of organisms made use of, viz., the so-called "naked" bacteria and "natural" bacteria. By "naked" is meant, bacteria in pure culture grown artificially, as all laboratory cultures are carried on. By "natural" is meant, bacteria as they occur in nature, for instance, the bacterial contents of fæces.

A disinfectant may have a very different action when tested against the "naked" to that which it has against the "natural" bacteria, no doubt due almost entirely to the necessary presence of organic matter with the latter. It is obvious that the practical value of experiments made with disinfectants against "naked" bacteria will be less than those made against the micro-organisms existing in a "natural" medium.

The first table shows the "phenol co-efficients" of some of the more common disinfectants when tested against "naked" bacteria. By "phenol co-efficients" is meant the bactericidal power of a disinfectant in comparison with that of phenol, which experience shows is best adapted for the unit of comparison. In these experiments the test culture has consisted of a twenty-four hours' growth of either *Bacillus typhosus* or *Bacillus prodigeosus*. Both these organisms appear to re-act to disinfectants in nearly the same ratio. Either a broth culture or a filtered emulsion of an agar slope was employed, it being a matter of indifference whether one or the other was used.

The second table shows the values of these same disinfectants when tested against "natural" bacteria. The method was carried out in the following manner:—

One gramme of solid normal fresh human fæces was emulsified

in a mortar with 100 cubic centimetres of fresh human urine, and filtered through a filter paper, in order to get rid of the very coarse matters, yet allowing bacteria to pass easily. Equal parts of this emulsion was then added to equal parts of disinfectant, thus making the required dilution; for instance, supposing phenol 1 in 90 was to be experimented with, the solution of phenol would be made up 1 in 45, and when a given volume was diluted with an equal volume of urine and fæces, the final dilution would be 1 in 90. Loopfuls were taken out after certain periods of contact and transferred to broth, in accordance with the procedure of the "Drop" method as originally explained by Rideal and Walker.[1]

It will be noticed that the disinfectants of the tar derivative series act in practically the same manner against both "naked" and "natural" bacteria, but a very marked difference in the "phenol co-efficient" figure will be observed in the case of mercuric chloride, permanganate of potash, iodine and all the halogens. It is astonishing how very greatly mercuric chloride efficiency is lowered, even when an acid is used in conjunction, to obviate the precipitation of the albuminate of mercury. Permanganate of potash comes out of the test with much greater power than many would give it credit for. Iodine is seen to lose its disinfectant properties almost completely in presence of organic matter. These experiments clearly point out that it is necessary, not only to test a disinfectant against "naked" bacteria, as is usually done, but also against "natural" bacteria, using an emulsion of fæces and urine, or some other similar mixture of organic matter.

PHENOL CO-EFFICIENCY.

TABLE I. Against "naked" bacteria

Phenol	1
Mercuric chloride	3,000
Permanganate of potash ..	40
Tincture of iodine	18
Formalin	0·7
Cyllin	8·5
Kerol	7·5
Izal	5·5
Lysol	2
Liquor cresyl saponatus ..	2·7
Lysoform	0·5
Oleusaban	0·08
Listerine	0·03
Pino-phenol..	2·5

TABLE II. Against "natural" bacteria

Phenol	1
Mercuric chloride	2·5
Mercuric chloride, 1 part Hydrochloric acid, 2 parts	9
Hydrochloric acid	1·5
Permanganate of potash ..	7
Tincture of iodine	0·5
Formalin	0·7
Cyllin	8
Kerol	7
Izal	5
Lysol	2
Liquor cresyl saponatus ..	2·5

[1] *Journal of the Sanitary Institute*, vol. xxiv., part III., 1903.

I made use of a mixture of fæces and urine, since it is the chief material which we are called upon to disinfect when treating cases of infectious disease.

The practical conclusions I would draw from these experiments are as follows: In order to disinfect a liquid stool, such as that from an enteric, dysentery, or cholera case, it is both desirable and necessary to use a solution of phenol of not less strength than 1 in 20, and add a quantity equal in volume to the volume of stool to be disinfected, thus bringing the final dilution to 1 in 40 of phenol, and give a five minutes' contact, after thorough mixing. The strength of any other disinfectant to be used can be worked out from its "phenol co-efficient." Say that we elect to use Izal. The co-efficient of Izal is 5. It will therefore be necessary under similar circumstances to use a dilution of Izal 1 in 100, and add an equal volume to that of the stool, the final dilution being 1 in 200. The disinfectant should be well mixed with the stool and five minutes' contact always allowed. If the practical disinfection of ordinary excreta is to be reliable and thorough, it must be clearly recognised that the mere receiving of the material into a solution or emulsion of some disinfectant, or the mere dousing or flooding of the mass with such solution or emulsion, is useless. In all cases the intimate mixture of the fæcal mass with the disinfectant must be secured, and in no way can this be better done than by deliberate stirring up of the whole by means of a stout stick or wooden spoon. It may be assumed that the volume of an average stool, as passed from a patient, is not less than eight fluid ounces, or 227 cubic centimetres, and to this must be added an equal volume of the stock solution or emulsion of whatever reagent is being used, and the whole intimately mixed. The working strengths of such stock solutions must be based on results as obtained in previous laboratory experiments on the lines detailed. These suggest that the stock solutions or emulsions of certain common disinfectants may be placed at the following strengths:—

Phenol	1 in 20
Mercuric chloride	1 ,, 50
Mercuric chloride, 1 part } Hydrochloric acid, 2 parts } ..	1 ,, 180
Permanganate of potash	1 ,, 140
Formalin	1 ,, 14
Cyllin	1 ,, 160
Kerol	1 ,, 140
Izal	1 ,, 100
Lysol	1 ,, 40
Liquor cresyl saponatus	1 ,, 50

The practical conclusion to be drawn from this statement is that we are in the habit of using, for routine disinfection, an acid solution of bichloride of mercury which is nearly five times too weak for the rapid disinfection of excreta. In other words, the official stock solution is a dilution of 1 in 960, while, if we want rapid and effective action upon fæcal material it should be at no greater dilution than 1 in 180. This would be represented by 1 gramme of the bichloride, 2 cubic centimetres of strong hydrochloric acid, made up to 180 cubic centimetres with water. This, added to an equal mass volume of excreta, would mean an actual working dilution of 1 in 360.

SUGGESTIONS FOR THE PREVENTION AND TREATMENT OF VENEREAL DISEASE IN THE ARMY.

By Lieutenant-Colonel E. BUTT.
Royal Army Medical Corps.

Readers of the Reports of the Advisory Board for Army Medical Services on the treatment of venereal disease in the Army, cannot have failed to note the diversity of opinion evidenced therein that exists amongst the civil and military members of our profession regarding the treatment of such ailments, and that diversity of opinion is not confined to remedies but extends to prophylaxis, and to when treatment should commence and when terminate.

Again, the treatment of syphilitics intra-muscularly by injection of metallic mercury has had an extended trial in India under very favourable circumstances, the advantages of this method of treatment having been clearly pointed out and its systematic trial urged by the Commander-in-Chief and the Principal Medical Officer of that country. The reports of the medical officers who adopted this treatment give rise to the feeling that they are not in harmony as regards the advantages claimed for it, for whilst the majority confirm them others have not found it to possess any distinct claim to usefulness over other methods, and it has even been said of it that patients submitting to it render themselves liable to injurious consequences. The varying results of treatment as affecting re-admissions are also striking.

In view of such conflict of opinion, and having regard to the fact that the advocates of such opinion are justly entitled to respect and consideration, it requires considerable courage to set oneself at variance with it, and it lays one open to a charge of egotism if one enters the arena of such conflict and attempts to dogmatise. Considering, however, the importance of the subject as affecting the individual, the State and humanity, I submit that this should not prevent anyone who firmly believes in the soundness of his contentions, and whose experience has convinced him of their truth, from boldly expressing them, in the hope that they will be productive of some good. Before an attempt is made to formulate remedial proposals, it is necessary to have a clear conception of the material we have to deal with and the conditions to be provided for. In addition to the conflicting opinions that obtain regarding treatment, and the varying success attained by those who practice certain

methods, we must take into consideration that there exists a want of professional interest in venereal ailments, and that they have not received, until recent years, that attention that their importance justifies.

Our Army is composed, for the most part, of young soldiers, healthy and vigorous; but a moiety of them are permitted to marry; want of self-control, whether due to inherent individual weakness, evil association, or removal from home influence, is too frequently evident; they are so circumstanced that they have a considerable amount of idle time at their disposal, which, under the exigencies of service, is often associated with monotony, and their environment often includes temptation, at once dangerous and seductive, which many of them seem to be incapable of withstanding. It is true that their moral and disciplinary training, and all that concerns their comfort, healthful amusement and well-being, have received, and are receiving, the attention such matters rightly deserve, and that they are ever being reminded of the dangers that want of self-control subjects them to, yet many remain uninfluenced, and we find abundant evidence of this truism in our hospitals. Taking these factors into consideration, I think it is incumbent on us, so far as we are concerned, to treat them as sufferers rather than offenders, sympathetically rather than rigorously, and that they are entitled to, and should receive, the same care and attention that we bestow on sufferers from other ailments. The conditions therefore are:—

A confusion of thought regarding treatment, remedial and disciplinary.

A considerable range of results attained by those practising modern methods of treatment.

Lack of professional interest in venereal ailments, and, as a result, a tendency on the part of our graduates to be satisfied with a superficial knowledge of them.

The existence of men who are unmoved by fear, moral, persuasive or educational influence, and who appear to be incapable of controlling their passions; and of women, diseased, or liable to become so, ever present, and who are ready to gratify their desires.

In discussing remedial measures I shall do so under two heads—Prophylaxis and Treatment.

Prophylaxis.—Apart from educational and persuasive preventive measures, I submit the following are worthy of consideration:—

(1) Harmonious and combined action on the part of Municipal Authorities, Medical Men, Officers in Charge of Lock Hospitals,

and Officers in the Army, in Military Stations at home, and similar action on the part of the Civil and Military Authorities abroad, having for its object the voluntary subjection to treatment of women suffering from venereal disease and the making of adequate provision for such treatment. (2) Strict medical surveillance of the men, whereby disease is detected early. (3) Prevention of transmission of disease by infected troops by treatment.

(1) Venereal affections in their early stage do not cause much personal inconvenience to the sufferers therefrom, relief is therefore seldom sought until necessity compels. Existing Lock Hospitals are associated with shame, and often objected to on this account, and even if those that entered their portals could be induced to remain until the impossibility of transmitting disease was assured, expense would render this course impracticable if treatment is continued on the old lines. A determined effort should therefore be made to induce such sufferers to submit to treatment, and everything that could be accomplished in allaying their objections, and in making provision for their comfortable reception in suitable institutions, undertaken. There is no apparent reason why intramuscular treatment should not take the place of other methods; this would have the advantage of limiting their stay in hospital, and thus reduce expenditure, and if this treatment could be continued uninterruptedly thereafter, it would possess the further advantages of doing away with their capability of transmitting disease without causing them inconvenience. I quite understand the enormous difficulties there are to be surmounted in giving effect to these proposals, but much has been already accomplished in India, in this direction, by individual effort, and the results have been eminently satisfactory.

(2) The necessity that exists for the early detection of disease cannot be too strongly insisted on, and no opportunity should be lost in impressing the fact on officers and men.

The advantages of medical surveillance are self-evident, but to be effective it must be thorough, and carried out in such manner as to make the men realise an interest is being taken in them. Under existing regulations men are paraded weekly for a so-called health inspection. This parade is as a rule badly attended, and the examination is a superficial one. In lieu of this inspection I suggest that a minute examination of the men be made weekly by companies, so that an entire regiment would be subjected to a rigorous medical examination once a month; individual health conditions would thus be ascertained, and concealment of disease,

whether wilful, or due to ignorance, or shame, detected. Advantage could be taken of the opportunity to explain to the men the early evidence of disease, and the advantages of early treatment. Fresh arrivals from any source should also be kept under medical supervision for such time as is considered necessary. The suggestion has also been made to train a non-commissioned officer per company (one who from his personality possesses the men's confidence) in the rudiments of hygiene and preventive medicine. Such non-commissioned officers would be of immense assistance to the medical staff, and might become valuable in many ways to the regiment.

(3) I consider that the continuous treatment of syphilitics has been the dominant factor in reducing the incidence of disease in India. Speaking from my own knowledge I can state that not one case of syphilis, contracted locally, occurred in my charge during the last three years of my residence in that country. I attribute this result to the control that was exercised over those bearing active manifestations of disease to the continuous treatment of all syphilitics, and to the rigid enforcement of the cantonment code, whereby women known to have communicated disease, had either to elect to submit to treatment in hospital or to be expelled from cantonments. There was no difference in local conditions for this period, when compared with those that obtained in former years, except that syphilitics were subjected to continuous treatment, and that the women betrayed an unmistakable desire to be guided by medical advice; and it is an interesting fact that none of the women contracted syphilis during the same period, although the number of syphilitics amongst the men never fell below 100, and that in each of the three years there was a change of garrison. This statement, which can be verified, cannot fail to impress, and supports the contention that when local manifestations of disease are removed (viz., local sore, syphilides on mucous membranes and skin) by treatment, and so long as continuous treatment is pursued, there need be no fear of communicability.

I hold the opinion that infected spermatic fluid is a source of contagion. I have not been able to prove this conclusively, but I have had strong presumptive evidence in its favour, and having regard to what we know of hereditary syphilis, and assuming that syphilis is caused by an organism, there is no reason to negative the opinion which, if true, is a strong argument in favour of continuous treatment as a preventive measure.

Treatment.—Mercury, although its action or the change that

takes place in its constitution in its passage through the system is not even now definitely understood, has at all times held the premier position as the remedial drug of our profession, but that it did not quite fulfil requirements is evidenced by the number of its preparations, and the different methods of administration that have from time to time been tried. Iodide of potassium has also had its advocates, and is used alone and in combination with mercury to the present day. It will be generally admitted that we possess in each useful remedies, but I contend that each has its own sphere of usefulness, and that there is a limit to what either will accomplish in a curative sense. It is held by those who endorse the germ theory of syphilis that it kills the organism. It may, however, render it inert, or it may act by antagonising or destroying the toxines evolved through the agency of the germ or by altering the tissues or pabulum in which the germ naturally thrives. No doubt it is very desirable that the action of mercury, as well as the change (if any) that takes place in its constitution in its passage through the system, be definitely ascertained, but I submit, because our knowledge in either regard is merely speculative, it need not immediately concern us if its introduction effects the result we desire.

According to my experience mercury, when given in sufficient doses, acts promptly on early syphilitic manifestations (with the exception of gland induration), and causes them to disappear; if, however, its administration is here discontinued, or if, when continuously given, the dosage falls short of that which originally neutralised, or attenuated the virus, relapses occur; if, in other words, the quantity of mercury introduced into the system at regular intervals is not sufficient to replace that which is lost by excretion and to insure its constant and effective action on the virus, the latter appears to regain its vitality, and as evidence of its continued activity we have relapses. Gland induration is the last symptom that mercury appears to influence, and it undoubtedly does so provided treatment has been early and continuous; when this influence extends to resolution of the proliferated cells I believe a cure has been effected, and I submit this is accomplished in a shorter time than is generally supposed. In chronic syphilitics, viz., those which do not come under our observation until the system has become impressed by the virus, or in those who have been subjected to vicarious or interrupted treatment, in whom the glands are usually universally indurated and betray evidence of organic change, mercury will also be found useful if given as

already indicated, but its usefulness appears to be confined to controlling and ultimately stopping the further ravages of the disease; it does not remove the products thereof when organised; iodide of potassium, on the other hand, appears to possess this power to a limited extent, but has little, if, indeed, any, effect on the virus; its action therefore obviously suggests its being used in the later treatment of chronic syphilitics.

It may be of assistance if the history of an ordinary case of syphilis be here superficially traced. The first evidence of syphilis is a local sore, which may or may not enable us to decide the nature of the disease we have to deal with. Sooner or later one or more of the so-called classic symptoms appear: induration of lymphatic glands and syphilides on skin and mucous membranes; their regularity and manner of appearance suggesting that the virus, whatever its nature, expends its energy in the early stage at least on the lymphatic system, skin and its appendages, and that it gains an entrance to the system through the lymphatics. Associated with these classic symptoms there may be merely a sense of general malaise, or the general health may suffer in varying degree, but it is not until later, as a general rule, that destructive lesions of the tissues or important organs occur. It must be conceded that now and again one meets with cases that do not follow the above course, so-called malignant cases, where grave constitutional symptoms associated with destructive lesions are early manifestations. Of the so-called classic symptoms the one to my mind of paramount importance is induration of the lymphatic glands; it is the first to appear, it is never absent, it increases in character and extent as the disease advances, it persists while the disease lasts, even when other manifestations have vanished, and it disappears in initial cases when the disease is cured, and is modified in chronic cases when a similar result is attained. This at least has been my experience, which, if confirmed, is of the utmost importance clinically.

It may also assist if a clinical picture is portrayed of the usual effects of mercury on the manifestations of an ordinary case of syphilis.

In the old days various preparations of mercury and various methods of administration were employed, according to the individual belief entertained in one or other by the medical men who used them, with practically similar results. So soon as the patients were "under the influence" of the remedy (the time this was accomplished depending on the amount of mercury administered,

the frequency with which it was given, and the steps taken to prevent its elimination), the local manifestations began to disappear, and so long as the remedy was continued, these manifestations (excluding induration of lymphatic glands), gradually, if slowly, vanished, but during such treatment, when once the desired physiological effect of the remedy was produced and maintained, there were no fresh developments, no recrudescences, the sufferers were then discharged from hospital, and treatment either here stopped, or advice given to continue it at intervals, relapses being frequent.

This picture is reproduced to-day when modern methods are employed under similar conditions. It is true that we are enabled by adopting these modern methods to gauge accurately the quantity of mercury introduced into the system, and to reduce the time necessary to produce a certain physiological effect, therefore local manifestations commence to disappear earlier, but thereafter the history is the same, gradual disappearance of symptoms without recrudescence, and our patients are discharged from hospital. At this point, however, a change has taken place in our methods of dealing with them. They are subjected to continuous treatment so long as there is no indication of the physiological effect being over-produced, but from the reports of medical officers who pursue this practice two distinct results are attained. In one, some relapses occur, and in the other, I find, they do not. I attribute these varying results to the quantity of mercury administered at regular intervals being insufficient to replace that lost by excretion, and to insure its constant physiological effect. I have repeatedly satisfied myself of the truth of this assertion, having frequently had to deal with patients who had been subjected to continuous treatment for months, yet who bore evidence of active disease (the dosage employed being one grain fortnightly, or half a grain weekly), whose symptoms rapidly disappeared, and did not recur when the dosage was increased. It would appear then that the primary action of mercury on the syphilitic virus is an inhibitive, attenuative, or a controlling one, when administered in sufficient quantity, and that it is necessary to keep this influence up continuously for a prolonged period to prevent its renewed activity, and that the quantity of mercury necessary to accomplish this for each individual requirement can be ascertained by observation alone.

The arguments in favour of early treatment, in my opinion, far outweigh those that have been advanced against it. Prompt treatment of syphilis at the time of early infection is in accord with

common sense, and in line with the treatment of all other diseases. If, as I assert, it aborts, or reduces the intensity of the usual secondary manifestations, there is every reason to think that it controls or abolishes the later destructive lesions of the disease; if, on the contrary, relief is not sought, or patients are subjected to a vicarious, or procrastinating treatment, the conditions are changed, the virus continuously, if slowly, operates, and there possibly comes a time when the destruction of vital tissue has already advanced, or is advancing, beyond the hope of permanent repair by means of any known remedy.

Early treatment being considered essential, early diagnosis becomes an important factor, and accurate observation a necessity. The questions here arise, when should treatment commence and when terminate? Admittedly controversial, but which must be solved if we are to attain that degree of success in the treatment of syphilis that has attended our efforts in dealing with other diseases. Is there, then, any early symptom, one that is invariably and unvaryingly present before there is manifest evidence of systemic intoxication, and is there any similar symptom that will enable us to decide, with some degree of certainty, that the virus has lost its activity? I submit and believe induration of the lymphatic glands answers the former question, and resolution of the same glands in syphilitics treated early, and reduction in their size, or degree of hardness in chronic syphilitics, the latter.

It is as well to state I have not, as a general rule, put these views into universal practice, lest it should be said of me "I have not been treating syphilis." It is an interesting fact, however, that amongst the cases at home and abroad in which I did put them into practice, no secondary manifestations whatever appeared during the time they were under my observation, which, I regret to say, did not in any case exceed seven months.

In giving effect to these views it must be admitted that mistakes may occur in diagnosis, but, in my opinion, such need not occasion alarm, for the symptom that would induce us to adopt active treatment, in the absence of syphilitic or other grave cause, would disappear, when there would be no further necessity for its continuance, and we ought to be able to exclude what is included in "other grave cause" when determining the course we should pursue. I am not a believer in the harmful effects of mercury on the human system when carefully and intelligently administered; I have never met with them, although I have treated hundreds of syphilitics and administered thousands of injections.

As an aid to diagnosis a brief history should be taken of every venereal sore coming under observation; this history should include the characteristics and site of the local ulcer or ulcers, probable date of infection, and above all an accurate record of the character of the lymphatic glands of the groin, elbow and neck. This history should be available for reference by medical officers at their daily visit, and important developments should be recorded thereon for their own information, or for anyone that succeeds them. As a further aid to diagnosis no mercurial preparation, or anything that would tend to local irritation, should be applied to venereal sores; they are not necessary, and mercury locally applied tends to delay evidence of specific disease, if such be present.

Absolute cleanliness, and the absorption of local discharge by desiccating powders, and dry dressing frequently applied, fulfils requirements; this treatment of local ulcers, or chancroids, is the most effective, and at the same time the most rapidly curative method I have tried. In instances, however, where such ulcers are covered with grey sloughs, the following procedure is recommended before the powder is applied: After thorough cleansing and drying, the base of the ulcer is grasped with the finger and thumb (its surface being thus well opened out), and peroxide of hydrogen applied by means of a glass brush until a raw surface is obtained. I desire here to express the opinion, based on experience, that non-infecting sores, or chancroids, are simple, usually uncomplicated, and most amenable to treatment when they come under our notice early, and that their varying characteristics are due to neglect on the part of the sufferer, want of local cleanliness, or to pent-up discharge. The discharge from such ulcers is virulent in the extreme, and if permitted to remain *in situ*, or if owing to the local inflammation and œdema which it occasions it becomes pent up, the ulceration may even extend to necrosis. Here then is another proof of the necessity of medical surveillance of the men. Even after venereal sores have been successfully treated it is necessary to keep the sufferers therefrom under observation for at least a period of two months, the history already referred to being sent to the medical officer in charge of the regiment. I desire here to draw attention to a condition that not infrequently presents itself, and for the amelioration of which circumcision is often resorted to—possibly the exact condition is not at first recognised, and looked on as one of aggravated gonorrhœa—I refer to veneral sores associated with acute œdematous inflammation of the prepuce and phymosis. When circumcision is

resorted to in these cases the cut surface often assumes ulcerative action of a destructive nature, and the sufferers remain inmates of our hospitals for a lengthened period; should syphilis further complicate matters, mercury cannot be administered in desirable quantity, owing to the debilitated condition induced by confinement to bed, &c. I suggest as an alternative remedy, frequent and thorough cleansing of the preputial pouch (using a large metal syringe for the purpose) with well-diluted, warm, antiseptic lotion, packing the pouch with strips of dry lint, removed as often as they become soiled, and the application of a bandage so adjusted as will keep the penis raised against the abdominal wall. By adopting this method I find that local inflammation and œdema disappear in from thirty-six to seventy-two hours, to the extent that will enable the ascertainment of local conditions. As a further aid to the accomplishment of this end (in aggravated cases) gradual dilatation of the preputial orifice is recommended.

The entrance of the syphilitic virus into the system through the lymphatics, and the fact that it apparently expends its initial energy on the glands, suggests introducing the remedy through the same channel, and as Service conditions have to be taken into consideration, it is also necessary that it should be introduced in such manner and in such quantity as shall fulfil the following requirements: certainty of introduction in predetermined doses, rapidly and continuously, compatible with safety, to produce a desired effect, whereby the virus is continuously and effectively acted upon and kept in subjection, until finally overcome. Mercury introduced by inunction, or intra-muscularly, I submit, enables us to accomplish these conditions, but for obvious reasons the latter method is the most convenient.

So long as the excretory functions are normal one grain of mercury, administered intra-muscularly, may be looked on as a safe dose; should this quantity materially influence local manifestations it should be continued uninterruptedly, weekly, when not contra-indicated. Should local manifestations remain uninfluenced an intermediary dose of half-a-grain should be given on the third or fourth day, the effect watched, and if necessary repeated in gradually increasing doses with the same interval and the same reservation until the desired effect is produced; thereafter one grain of mercury should be introduced weekly, so long as there is no evidence of mercurialisation or the presence of a tumour or nodosity at the site of injection, until the glands soften, or lose their characteristic hardness, when it should be discontinued. The presence

of these nodosities is, in my opinion, an indication that the point of systemic toleration to mercury has been reached. I am aware that they have been attributed to faulty administration, but my experience has not confirmed this. They do not contain pus, and apparently consist of cream surrounded by thickened tissue. They have been skiagraphed, and found to contain mercury three weeks after its introduction. They occasion little, if any, inconvenience. There is a certain regularity in their appearance, for instance, they are found earlier in initial than in chronic cases, and earlier still in either if, for any reason, the patient is confined to bed (suggesting slow elimination and accumulation in cases subject to confinement); when once they appear they are invariably to be found after each succeeding injection, and evidence of mercurialisation follows their continuance. I suggest, as they are seemingly of infrequent occurrence, that they may have been possibly overlooked, or, as I think is more probable, that mercury is not generally administered in such quantity as to occasion them. They disappear, as a rule, in two or three weeks in patients actively engaged; injections are then continued.

The *technique* of administering mercury intra-muscularly is simple in the extreme, but attention to detail is absolutely necessary if untoward or serious results are to be avoided.

The points to be safe-guarded are:—

(1) Normal activity of excretory organs.

(2) Absolute cleanliness.

(3) Minute and equal division, and unvarying proportion of mercury, in the substance employed to hold it in suspension.

(4) Absence of all evidence of mercurialisation before administration is repeated.

Technique.—The syringe should be all glass and provided with iridium plated needles.

The cream when about to be used should be well stirred with a glass rod, and of such consistence as will not, at one extreme, permit of the imprisonment of air bubbles in the barrel of the syringe, yet, on the other, will enable it to flow with facility through the needle; it should be stored in one ounce glass bottles, provided with closely fitting glass stoppers, and concave bottoms, and during warm weather, or in the Tropics, should be kept in an ice-box until required for use.

The injection should be administered under scrupulously aseptic conditions, and the needle plunged into boiling oil before and after each injection; when it is necessary to cleanse the needle during

the operation, small strips of clean linen should be used for the purpose.

The site for injection should be the gluteal region, above and along a line connecting the upper border of the great trochanters. They should be administered alternately on either side of the fold of the nates. It is as well to avoid the outer third of this line, as small vessels are more frequently punctured in this region than the inner.

The muscles should be relaxed at the moment of inserting the needle to facilitate its passage, and to diminish the little attendant pain. This is accomplished by getting the patient to stand on one limb and flex the knee of the other on the side that the injection is to be administered. Then if the operator, standing behind the patient (the syringe being held in the right hand), touches the gluteal region with the forefinger of his left, the attending muscular contraction, due to anticipation of pain, is thereby overcome; the needle is then immediately, and without hesitation, plunged in. It is strange, but none the less true, that when the patient is questioned as to when he felt the needle enter, he almost invariably attributes it to the occasion of the finger touch. The muscles should also be kept relaxed for a brief time after the injection has been given to prevent the regurgitation of the cream along the needle track, a cause of local induration and discomfort.

To prevent the possibility of injecting the cream directly into a vessel it has been proposed to separate the barrel of the syringe from the needle after the latter has been introduced, when, if such accident has occurred, it will be at once recognised. The site of injection should be examined frequently in patients under treatment in hospital, and before each succeeding injection in patients treated in barracks, for evidence of nodosities. The least tendency to mercurialism should be an indication to withhold further injections for a time (according to my experience nodosities appear before any other evidence of mercurialism). The excretory functions must be normal; if examination of the urine reveals albumen, and it does not diminish or disappear after the first injection, mercury must be withheld, and the condition dealt with on ordinary principles. Patients undergoing treatment should be in the open air as much as possible, and lead active and temperate lives. Exercise is of importance inasmuch as it helps in the diffusion of the injected cream, and stimulates excretion. The hygiene of the mouth should be attended to, and occasional weekly warm baths indulged in. The diet should be nutritious and ample.

Résumé.—Sufferers from venereal ailments should come under our control and treatment as early as possible after infection.

No mercurial or irritating remedies should be applied to venereal sores.

Active treatment should begin on the earliest possible date, as soon, in fact, as we can reasonably assume we are dealing with syphilis, the index of such assumption being the appearance and increase of induration of the lymphatic glands under observation; or, when the case is presented to us, if they be already indurated, the increase of such induration, and its extension to other glands.

Treatment consists of the introduction of metallic mercury, intramuscularly, by injection, in such doses as will, in the first instance, materially influence local manifestations, and thereafter, as will keep up a continuous inhibitory action on the virus, provided its continuance is not contra-indicated, until the glands resolve in initial cases, and until induration is modified in chronic cases.

General Remarks.—These are the lines on which I, and those associated with me, have worked for some years. The results have been invariably satisfactory, and have impressed both Commanding Officers and Medical Officers (Principal and Administrative included), who have had the opportunity of judging and observing our work. None of our patients have suffered from any of the graver manifestations of the disease—eye, nervous, or bone affections—whilst under our observation, nor did the question of having to invalid any of them arise, and on this account alone I submit there is some justification for the belief we have in the efficacy of the treatment pursued.

No untoward accident has followed our methods; had any occurred they would have been heard of.

The patients realised they were benefited, and to this fact more than to any other I attribute the disappearance of opposition to intra-muscular treatment.

Commanding Officers found that the general health conditions of the men improved, and that the numerical effectiveness of their regiments increased, and therefore cheerfully assisted us.

After all, what I have written is but an expression of the outcome of careful thought applied to personal experience. Statements of fact, however, are not convincing, and I do not, or cannot, expect them to obtain general acceptance until verified. The appreciation of this consideration has prevented me, until now, from doing more than try to influence those whom I have been brought into contact with, when opportunity afforded me the means of demonstrating my views, and it is pleasing to be able to state that the success that has attended my efforts in this direction has been encouraging.

We, as a profession, are conservative, we believe in the methods

we have been taught, and those we are in the habit of employing, and we look with scepticism on anything new, unless it is associated with eminent authority, or is clearly demonstrable; this is just and reasonable, and when there is added a possible element of danger in carrying out a proposed remedy, who can blame if, in the exercise of care, it is not pushed to the extent suggested as necessary to produce a certain physiological effect.

Under existing conditions it is almost impossible for us individually to produce reliable statistical evidence in support of our contentions, or to have our patients under our observation for a sufficient time to enable us to arrive at definite conclusions; the exigencies of service, which necessitates frequent changes of stations for both officers and men, militates against either; work thus becomes irksome and disheartening when the material we are using for the solution of the problem is ever changing. But cannot these difficulties be overcome?

Personally, I consider they can, and I venture to suggest the following proposals for consideration:—

The establishment of venereal divisions in our hospitals at large stations, where venereal disease is known to prevail. The equipment of such divisions with the necessary appliances, &c., for research, and the carrying out of treatment on approved methods. The appointment of selected officers to the charge of these divisions during their period of home service, or for three years abroad. Non-removal of the units composing the garrison of such stations, except in emergency, for a period of three years.

Apart from the educational advantages such divisions would afford to the attendants and young medical officers passing through them (where they would have an opportunity of seeing and observing the effects of the methods employed, and who in turn would become fresh foci for the dissemination of the knowlege they acquired), I submit that it is possible a decision could be arrived at on the various controversial questions associated with this subject, and the collective reports of Medical Officers in Charge might be expected to carry weight with our own officers and the profession at large.

NOTES ON THE HEALTH OF EUROPEANS AND NATIVES IN PEKING.

By Captain F. E. GUNTER.
Royal Army Medical Corps.

Part I.

These notes are for the most part taken from a Report I published while stationed in Peking.[1]

The matter of the Report was mainly statistical, comparing the returns of the different Legation Guards. Some of the tables I have included here, as it is, I think, the simplest way of showing the comparative incidence of disease in the various nationalities. In Peking one has a quite unique opportunity of studying the health of various nationalities in the same climate. The only varying factors are the condition of their barracks and their mode of life. For these reasons I think the following notes may be of some interest to readers of the Journal.

Climate.—Before discussing the diseases prevailing in Peking, it is well to give a short account of the climate. I very much regret that I have been unable to obtain any reliable meteorological records. The best that I can do is to quote from Surgeon-General Gordon's "Epitome of the Report of the Medical Officers of the Chinese Imperial Maritime Customs Service," 1871-1882, published by Messrs. Baillière, Tindall and Cox, London—a most interesting work.

Rain-fall, as a rule, does not exceed 26 inches.

Rainy season from beginning of July to middle of September. There are, however, usually a few sharp showers in April.

Rain falls on from forty to fifty days in the year.

In 1871 the hottest days were May 31st, June 5th and 8th, the temperature being 100° Fahr.

The hottest nights were July 22nd, August 3rd; temperature 77° Fahr.

The coldest days and nights are not given, but the thermometer often registers below zero on winter nights.

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[1] "A Report on the Health of Europeans and Natives of Peking, as deduced from returns of the various Legation Guards and of the English Charitable Hospital, during the year 1903." By Captain F. E. Gunter, Royal Army Medical Corps. Published by Peking Printing House, 1904.

Winds.—From October to February north and north-west winds prevail. From April to the end of September chiefly southerly, varying from south-east to south-west, although at intervals winds blow from east, north and north-west. The latter is the coldest wind, coming, as it does, from the high lands of Central Asia and over the steppes of Siberia and Mongolia. A severe blow from this direction in December will freeze the river in one night.

In spring dust-storms are of frequent occurrence. In summer storms of dust, frequently also of thunder and rain, or even hail, are common.

The Peking climate includes the extreme of heat and cold, from 100° Fahr. and above it in summer, to zero and below it in winter.

The seasons may thus be divided: Summer and winter four months each, spring and autumn two months each. The changes of temperature are great and sudden, yet, from the sandy nature of the surrounding plain, the weather is generally agreeable and dry. The early spring is intensely dry, as is also May. This seems to have the effect of making people nervous and irritable. The dust storms in the spring are extremely trying.

Habits of the People as Affecting their Health.—It is impossible to more than touch on these here. They may be summed up, amongst the poorer classes at any rate, in the one word "dirty." In the winter time the Chinaman seldom washes, or if he does, never below the neck. There is no regular system of latrines, the Chinaman performing the functions of nature in public at the sides of the road, but such is the value of human excrement for manure, that it is soon collected and can hardly be looked upon as a "nuisance" from an English standpoint. They have a wonderful system of covered drains, into which the sweepings of the street are washed every evening. The Chinaman seems quite oblivious to smells. It is a common sight to see dozens of Chinamen sitting on the top of one of these drains, buying and selling as happy as if they were breathing in the fresh country air, while the European passer-by is quite overwhelmed with effluvia. No ill effects seem to be traceable to it as far as I can ascertain.

Diseases.—The diseases amongst the Chinese have been compiled from statistics collected at the English Charitable Hospital.

This hospital was founded after the late war in China, from certain funds which happened to be available. It is intended for the treatment of Chinese, and is now kept up almost entirely from money subscribed by the Chinese.

The hospital staff has been almost exclusively composed of officers of the Royal Army Medical Corps and Indian Medical Service. One of the original members was Captain Dansey-Browning, R.A.M.C., to whose zeal and energy much of the success of the hospital is due.

Over 2,500 cases were treated at this hospital during the year 1903.

There were nineteen cases of whooping-cough and seventeen of mumps. Seventy-seven cases of dysentery were treated. This occurred especially during and after the rainy season, *vide* chart. Seventy cases of malarial fever occurred, the greatest number being in July. There was a remarkable fall in August, *vide* chart. Whether this fever is true malaria I am unprepared to say, as I have not had time to examine the blood thoroughly. Many cases undoubtedly are so, but whether the fever that you get here in the spring is really due to the malarial plasmodium I do not feel sure; certainly at this time of year there are no mosquitoes about.

Tubercle of the Lung.—Whether this can be considered a common disease I cannot really say. Everything seems to point in favour of its being so. Dust is everywhere, the winds are bitingly cold and everybody spits. In addition, all the windows of the houses are pasted up in the winter so that the rooms are extremely close. One thing against tubercular disease of the lung is the extreme dryness of the atmosphere. Speaking merely from opinion, I should say that tuberculosis is not easily acquired here, but that when once established, owing to the dust and wind, it develops fairly rapidly. The Chinese have for long looked upon the disease as infectious, but apparently take no rational means to prevent its spread. There were thirty-four "other tubercular diseases," chiefly tuberculosis of joints.

Syphilis.—The Chinese understand the use of mercury in syphilis. They popularly suppose that salivation is the poison of syphilis flowing out. Some of the most approved methods of the present day have been used from time immemorial, *e.g.*, fumigation and vapour mercurial baths. There were six cases of primary syphilis, one hundred and eleven secondary and twelve of hereditary. In all cases of venereal disease the Chinaman strenuously denies having ever had the disease or been in the way of getting it.

Of *gonorrhœa* there were thirty-one cases. Of course this number of venereal cases gives one no idea of the frequency of the disease. A Chinaman will not go sick as a rule unless the disease is in a somewhat advanced state. An exception to this is the Chinese

soldier, who, like his European brother in arms, is not averse to an occasional day off duty.

Scabies.—Two hundred and eight cases of scabies were treated. Scabies is by far the commonest disease we have to treat. It is, of course, due to the dirty habits of the people. It is most frequent in the early spring before the people are beginning to cast off their winter clothing. It is frequently the direct cause of eczema brought on by neglect.

Animal Parasites of the Alimentary Canal.—There were forty-nine cases of these, mostly round and thread worms.

Scurvy.—There were twenty-four cases of this disease, some of them rather severe. The cause of this is uncertain. It is certainly not due to the absence of fresh vegetables, for these are abundant and form a staple article of diet. I am more inclined to think that it is due to eating unsound meat.

Rheumatism.—There were 100 cases of rheumatism of various forms. I saw one or two cases of rheumatoid arthritis, but this is rare. The greatest number of admissions for rheumatism was in April.

Tumours, &c.—Sixteen cases of new growth came for treatment. There is nothing special to note except that mostly these were in an advanced state.

Diseases of Nervous System.—Forty were treated, but require no special mention.

Conjunctivitis.—There were 148 cases of conjunctivitis treated, mostly granular lids. It is nearly always, and probably rightly, ascribed to dust. The remaining eye diseases included keratitis (thirty-six), ulceration of cornea (twenty-seven), glaucoma (three), cataract (twenty-three), but are not worthy of special note except that the majority of cataract cases refused operation. The cases of diseases of the ear do not require especial mention.

Diseases of the circulatory system are remarkable for their absence. There were two cases of aneurism, one of left carotid the other of the abdominal aorta. Surgeon-General Gordon notes that diseases of the circulatory system are extremely rare, and ascribes this to the quiet and abstemious habits of the Chinese.

Diseases of the respiratory system are exceedingly common in Peking, by far the most frequent being bronchial catarrh. As might be expected this is specially prevalent during the dust storm period in the spring.

Diseases of the Digestive System.—There were 105 cases of indigestion. These were, for the most part, cases of flatulent

Table I.—Chinese.

***Summary of Diseases treated in the English Charitable Hospital,* 1903.**

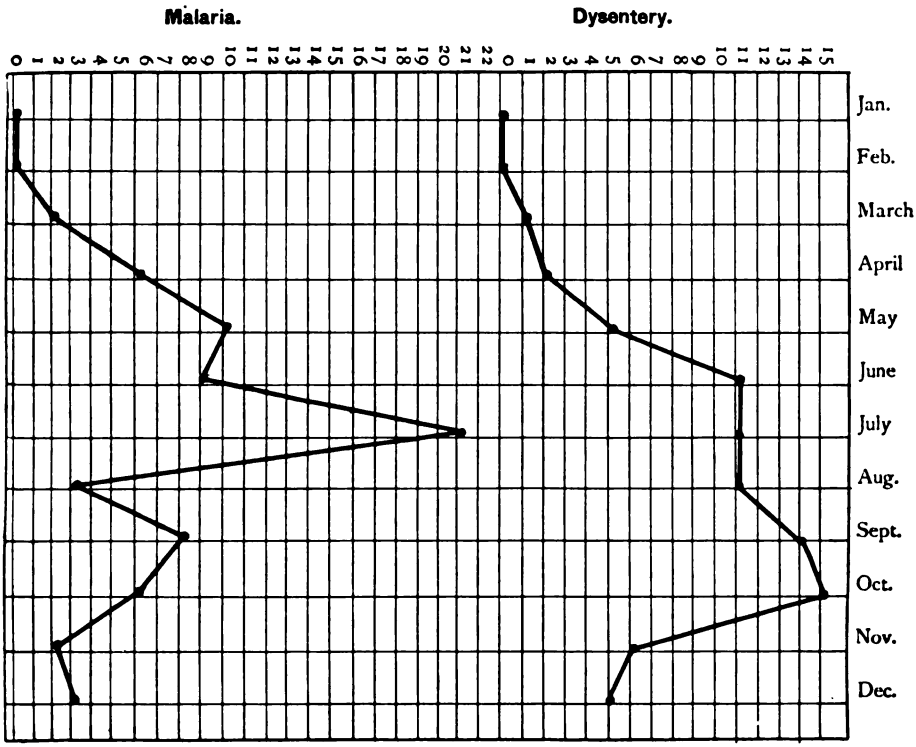
Diseases	January	February	March	April	May	June	July	August	September	October	November	December	Total
Small-pox													
Measles													
Scarlet fever													
Dengue													
Influenza													
Mumps	..	..	..	..	1	2	..	4	2	3	3	2	17
Diphtheria													
Simple continued fever													
Enteric fever													
Mediterranean fever													
Cholera													
Choleraic and epidemic diarrhœa ..													
Dysentery	..	..	1	2	5	11	11	11	14	15	5	2	77
Yellow fever													
Malarial fever	..	..	2	6	10	9	21	3	8	6	2	3	70
Erysipelas													
Septicæmia													
Pyæmia													
Tubercular diseases	1	5	5	10	12	9	8	9	4	4	3	4	74
Primary syphilis	..	..	1	..	1	..	2	..	..	1	1	..	6
Secondary syphilis	5	9	11	14	..	8	12	14	14	14	3	7	111
Gonorrhœa	2	..	2	4	2	1	7	2	4	3	4	..	31
Alcoholism													
Rheumatic fever													
Rheumatism	..	3	9	17	11	8	14	12	12	2	8	4	100
Neuralgia	2	1	2	1	1	..	..	1	..	1	2	2	13
Mental diseases													
Conjunctivitis	3	3	8	17	14	15	19	18	18	19	8	6	148
Disordered action of heart	..	..	..	..	1	..	..	1	..	1	..	..	3
Bronchitis	10	12	18	13	31	8	9	8	4	5	9	7	134
Pneumonia													
Pleurisy													
Sore throat	..	..	..	1	3	5	4	3	7	4	..	..	27
Tonsillitis	..	..	..	1	1	..	3	..	1	1	..	..	7
Inflammation of intestines	1	1	2	4	9	15	13	17	12	6	2	1	83
Inflammation and congestion of liver	..	..	..	..	..	..	1	..	1	1	..	..	3
Jaundice													
Soft chancre	..	..	1	1	2	..	1	2	1	1	..	..	9
Boils	1	..	2	6	6	7	7	9	8	6	9	4	65
Delhi boil													
Sunstroke and heat apoplexy ..													
Injuries, self-inflicted	..	..	..	..	..	..	..	..	1	..	..	..	1
Other injuries	4	3	11	11	13	9	11	11	8	8	17	10	116
All other diseases	49	69	144	163	165	136	129	134	149	133	98	95	1,464
Totals	78	106	219	271	288	243	272	259	268	234	174	147	2,559

dyspepsia which rapidly improved under drugs, such as bicarbonate of soda and bismuth.

Inflammation of intestines (*catarrhal*) is extremely common (eighty-three); as might be expected, it is most common in the rains.

Fistula in ano is fairly common (fifteen); there were only four cases of hernia, all of whom refused operation.

Chart showing Admissions for Dysentery and Malaria at the English Charitable Hospital, 1903.



There were very few cases of diseases of the urinary system. Of diseases of the skin by far the commonest is eczema (162); ulcers and boils are also common. There were several cases of injuries, but they do not require special note. Gordon says that sunstroke and heat apoplexy are practically unknown, that cholera occurs during the summer months (I have not, however, seen any cases) and that diphtheria is occasionally met with. He says that calculus is extremely rare; I myself have not seen a case. He notes the

frequency of carbuncle, and says that the Chinese class it with malignant disease. He also notes the great infrequency of trichiniasis.

Summing up, then, the diseases from which the poorer classes of Peking seem to suffer most, or rather come to the foreigners for treatment, are, for the year 1903, in order of frequency:—

Scabies	208	(Chiefly in the spring.)
Eczema	162	
Conjunctivitis	148	
Bronchitis	134	" " "
Abscess	124	
Indigestion .. .	105	
Rheumatism	100	
Inflammation of intestines..	83	
Dysentery	77	
Tubercle	74	
Malaria	70	
Boils	65	

(*To be continued.*)

NOTES ON SOME PREPARATIONS FOR PRODUCING LOCAL ANALGESIA.

By Captain J. W. H. HOUGHTON.
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As eucaine and adrenalin are now extensively used in the production of local analgesia for operative measures, a note on some of the commercial preparations of these substances now on the market may be of value.

Eucaine, as formerly employed, was obtained as a white crystalline powder, which required careful weighing and the addition of sodium chloride to make its solution in water isotonic for hypodermic infiltration.

This procedure is now simplified by the manufacture of solid preparations containing eucaine and sodium chloride in the necessary proportions, and by proportionate solutions of these salts issued in sealed glass vessels; also solid preparations containing eucaine, sodium chloride, and a product of the suprarenal body are prepared ready for use. My object was to test the efficiency of some of these preparations—the commercial names of which must for obvious reasons be withheld—and to note the following points. In the case of an eucaine and sodium chloride preparation, to determine its sterility or otherwise by inoculating various media, broth, gelatin and agar being used, and to test its analgesic effect on hypodermic infiltration; while a preparation of the suprarenal body was tested for sterility and blanching effect at the site of hypodermic infiltration.

(*a*) A solution of eucaine and sodium chloride in a glass capsule.—Sterile but only slightly analgesic.

(*β*) A foreign preparation of adrenalin chloride.—Sterile and not completely soluble in water after twenty-four hours. Turned pink deepening to brown on standing in solution and had blanching properties on hypodermic infiltration.

(*γ*) A solid preparation of eucaine and sodium chloride.—A good analgesic effect was obtained almost immediately after hypodermic infiltration, while boiling for a few minutes did not impair its action.

(*δ*) A preparation of suprarenal body in solution.—Sterile, but caused no blanching of skin on hypodermic infiltration, gave no colour reaction when exposed to air and was probably inert.

(ϵ) A solid preparation of suprarenal body.—When dissolved in sterile water became pink on standing, caused blanching of the skin on hypodermic infiltration and prolonged the analgesia when injected with eucaine.

(ζ) A solid preparation of eucaine, sodium chloride and suprarenal body.—When placed in boiling water dissolved in three minutes, turned pink on exposure to air, and on hypodermic infiltration the skin was blanched and analgesia complete.

(η) A solution of eucaine, sodium chloride, adrenalin and an antiseptic.—Sterile and caused blanching and analgesia at the site of hypodermic infiltration, which in an hour became inflamed and painful, leaving a brawny swelling for several days.

(θ) A solution of adrenalin chloride.—Sterile, turned pink on standing, caused blanching of the skin on hypodermic infiltration, and prolonged the analgesia when injected with eucaine.

These results, which were obtained on different individuals, show that the properties of the several preparations of these substances are liable to considerable variation. The solid preparation of eucaine, sodium chloride and suprarenal body, which in solution can stand boiling for a few minutes, thus ensuring its sterility, is a useful compound. It can be placed in a measured quantity of water, boiled and allowed to cool, when a sterile analgesic fluid is ready in five minutes, and the delay caused in weighing the various constituents is obviated.

The results obtained from the fluid preparations of eucaine and sodium chloride were not so satisfactory; while one solution of suprarenal body gave excellent results during twelve months' use with frequent exposures to air.

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THE PREVALENCE OF MEDITERRANEAN FEVER IN PORT SAID.

By Surgeon EDWARD H. ROSS.
Royal Navy.

This report is the result of an enquiry, which I made during my short stay at Port Said from June 23rd until July 19th, 1905. Much of the information then obtained and herein described is therefore necessarily based upon hearsay, and must be regarded as such; but I have confirmed many of the statements by personal observation, and the examination of hospital books, &c. These statements are derived for the most part from observers whose powers of accurate description are well known, and to whom I am deeply indebted.

Mediterranean fever is, according to many of the resident medical men, of recent importation so far as Port Said is concerned, for they state that seven years ago the disease was unknown in the locality. These gentlemen, who have been in practice in the town for several years, inform me that in the years 1897 and 1898, Mediterranean fever was conspicuous by its absence.

This observation is verified by reference to the books of the Egyptian Government Hospital. Previous to the year 1898, these books do not record a single case of Malta fever; and Dr. Orme, the present medical officer of that hospital, has informed me that, though he knew the disease well at that time, he does not remember a single case, nor was one ever noted by his predecessor, Dr. Milton.

The books of the English Hospital also do not show any cases prior to the year 1898, though some cases of "remittent fever" of a prolonged nature were admitted from those of His Majesty's ships which had recently arrived from Malta.

It may be regarded as probable, therefore, that Mediterranean fever was not endemic in Port Said up to the year 1898, but it must be remembered that the disease was not as well known then as it is now, nor were the present means of diagnosis then at our disposal.

Early in 1899 a small epidemic of Malta fever occurred in the convent which adjoins the Government Hospital, but I have been unable to obtain full particulars of this, except that the disease was undoubtedly Malta fever, and that only a few cases occurred.

In 1900 one or two stray cases were treated in the Government Hospital, while in the summer months, April, May, June, July, August, and September, 1901, the books of this hospital show in all four cases. Since that time the number of cases has gradually increased, until they have reached the number of fifteen cases from April to June (inclusive), 1905.

During my stay there were nine cases under treatment in this establishment; one of these had contracted the disease in the wards, and another Malta fever patient had not been out of Port Said for twenty years. The diagnosis of some of these cases I verified by the serum reaction, employing a subculture from a standard strain of the *Micrococcus melitensis*, which I obtained from Dr. Zammit's laboratory at Malta. There can be no doubt, therefore, that Malta fever is now endemic in Port Said.

In consequence of these cases I began my enquiry at the hospitals. There are two hospitals in Port Said, the Egyptian Government Hospital, containing 150 beds, and the English (Lady Strangford) Hospital, containing fifty beds. The former is situated on the northern edge of the town and overlooks the sandy waste ground, half a mile in width, between the town and the Mediterranean shore. It is surrounded by houses, and has at the back densely crowded bazaars and streets. The hospital itself is enclosed by high walls containing some trees and recently planted gardens. In this hospital Malta fever is endemic, and as mentioned above, cases of this disease have at times been contracted within its wards.

The English Hospital is situated actually on the sea front within thirty yards of the sandy seashore; it is built of wood, thatched, and owing to the proximity of the sea is raised on piles, while the Government Hospital is a well built stone structure. This English Hospital is exposed to the prevailing north-west wind, which blows steadily like a "trade" throughout the summer months. In it, although cases of Malta fever have been treated in the general wards from time to time, no patient or member of the nursing staff has ever contracted the disease, except in the instance of one doubtful case of typhoid, which occurred some years ago. These two hospitals then, differ in this respect, that although situated only half a mile apart, in one Malta fever is endemic, while in the other it is not. This fact is of interest, and, I think, of practical importance, for it gives us a valuable clue to the nature of the transmission of Malta fever. It is essential, therefore, that the sanitary condition of Port Said generally, and of the two hospitals particularly, should be enquired into.

The Sanitary Condition of Port Said.—Port Said is built upon a triangular spit of sand, at the northern entrance of the Suez Canal. The town has sprung up since the opening of the canal, and is rapidly increasing in size and commercial importance. It has, at the present time, a population of fifty thousand, consisting of people of all nationalities, a fact which has rendered its cleansing a matter of considerable difficulty.

The town is bounded on the north by the low-lying Mediterranean shore; on the west by the salt water lake Menzaleh, and on the east by the Suez Canal. To the east of the canal again there is the desert, which for a short distance, however, contains coal stores, several sea water lagoons, and a mile further extensive salt works. The town is thus surrounded by shallow sea-water lakes and salt pans, the importance of which I will allude to later.

The spit of sand upon which Port Said is built is quite flat, it rarely rises to more than five feet above the sea level, so that if a hole be dug in any of the streets, or under any of the houses, sea water is encountered at the depth of two metres; it will thus be readily understood how this sea water almost invariably percolates into the cesspools and sewage-pits, rendering the water in them intensely brackish.

The European quarter extends from the edge of the Canal westward for a distance of about one mile. This part of the town is well laid out, in the form of square blocks of buildings, between which streets run at right angles to one another. Many of the houses are well built of stone, while others are mere wooden hovels occupied by all sorts and conditions of people. The houses are generally overcrowded, but there are many waste spaces which, however, are rapidly being built over. In the angle between Lake Menzaleh and the Mediterranean the Arab quarter is situated. This consists of crowded wooden huts, which are very dirty, but with which the Sanitary Department is now trying to deal.

The climate is that of many other Mediterranean seaports, cold and rainy in the winter, but hot and rainless in the summer. There is, however, a damp prevailing sea breeze throughout the summer months, which, though it reduces the temperature, renders the hot weather very trying.

Water Supply.—Fresh water is conveyed to Port Said by the Sweet Water Canal from the Nile. This canal runs across the desert from Cairo to a spot nearly half way between Ismailia and Port Said, and then turns northward parallel to the Suez Canal. It is largely used for the irrigation of the land it passes through, as

well as for drinking. It is surrounded by weeds and low growth, contains much aquatic life, and is not railed off, animals and man having free access to its banks; one would expect, therefore, that the water would readily become polluted, and although this undoubtedly sometimes occurs in the villages on the banks of the canal, yet in Port Said itself water-borne disease, such as typhoid, though it exists, is not very common.

From the termination of the Sweet River Canal the water is passed through filter beds consisting of a gravel basis with superimposed sand, and is then stored in a large covered-in reservoir. The water is then pumped to an elevated tank, and from thence supplies the whole town. There is a good and constant supply through well-made and well-jointed pipes. The water "works" are controlled by a private company.

That this means of water filtration is efficient is shown by the sporadic nature of the cases of typhoid, which points rather to local than to the general pollution of the water supply. Ice is manufactured in Port Said.

Food.—Every article of food is imported, either from abroad or from other parts of Egypt. Most of the food stuffs appear to be good, though, as in other hot climates, acute diarrhœa of a mild type is fairly common, especially amongst new-comers.

Drainage.—The disposal of sewage, so far as the European quarter is concerned, is by the cesspool system.

These cesspools are situated under the houses, or the adjoining courtyards, and are pumped out every few months, and the sewage conveyed in iron tank-carts to a site beyond the cemetery, about a mile to the west of the centre of the town, where it is "dumped." This sewage is thus exposed to the action of the sun and forms a surface crust, under which the process of nitrification goes on, the sewage effluent gradually becoming purified as in a septic tank. Some of the crust is periodically sold as manure, for which it is very valuable.

Dirty water is either drained into these cesspools or into special pits dug in the sand under the houses. The water in these pits becomes mixed with the subsoil water which is derived from the sea and the Suez Canal, so that all of them contain a varying percentage of salt water. Larval insects, viz., mosquitoes, blood worms, &c., are found in them.

In some parts of the town it is common to see dirty water being thrown out into the street from the houses, shops and cafés. This habit is a most objectionable one, besides making it a matter of

considerable importance to walk in the middle of the street, but could be readily stopped by a little careful police supervision. But the presence of colonies of various nationalities, the individuals of which can only be approached through their own consuls, renders this a difficult matter.

In the Arab quarter the sanitary arrangements may be said to be *nil*. The Arab colliers are necessary for the coaling of the ships, but they are a perverse race, and matters of sanitation are foreign to their nature, for they apparently prefer the sea shore to enclosed latrines, and their door steps (or each other's) to urinals. These Arabs make the sea shore and the sandy waste places offensive with their excrement, and pollute the dust, which is blown about by the prevailing wind.

The Government has made several attempts to deal with these people, but probably only their wholesale removal to the east of the Canal will render them harmless to sanitation.

A proposal is now under consideration for the efficient drainage of Port Said, but owing to the complete absence of "fall" for the water, unless some expensive scheme, such as the *Schon* system, is adopted, its proper drainage will be a difficult matter; but considering the complete absence of any water drainage system, or of public urinals or lavatories, the overcrowding of the houses and the presence of the Arab coal-heavers, the place is not so dirty, nor do the streets smell as much as in some Mediterranean ports where sanitary matters are under legislative or even military control.

The Prevailing Diseases.—In addition to Mediterranean fever, one or two cases of malaria have occurred recently. There does not seem to be a sufficient number of cases to regard it as being endemic in Port Said, nor have I found any larval Anopheles near the town. I think, therefore, that the few cases that have occurred have been caused by mosquitoes introduced from Suez, for Ismailia is now free from that disease. As malaria is being stamped out from the Isthmus it will probably cease in Port Said also. Plague has been present in Port Said now for some years, as in some other parts of Egypt. The enormous amount of shipping which daily passes through the port, connecting it with the east, and the difficulty of dealing with the Arab colliers, will probably account for its continuance. As mentioned before, enteric fever occurs occasionally, but rarely in epidemic form; it is not more prevalent in Port Said than it is elsewhere. Diseases caused by the schistosomata (bilharzia), and ankylostomata, are very common amongst the Arabs, but these hardly come under the consideration of this paper.

Cases of small-pox occur now and then, usually brought by the ships.

A number of cases of Malta fever occur in the town, which are not sent to hospital. Many of these are treated in their own homes, while some mild cases are apparently not treated at all.

Dr. Cassala has informed me that he has had fifteen cases of Malta fever, from January to June of the present year, amongst his patients in the Italian colony, which is one of the largest in Port Said; and Dr. Cuffey states that there were only three cases amongst his patients in the English colony, which is one of the smallest.

No system of notification exists for this disease, while that for others is very imperfect. The disease, therefore, is commoner than one is at first led to suspect. Taking into consideration the sanitary condition of this town as here described, the number of cases of Malta fever compares very favourably with that of Malta, when allowance has been made for the difference of population (50,000 to 170,000).

The two Hospitals.—The sanitary conditions of the two hospitals resemble each other in most respects. Both hospitals are clean and exceedingly well managed, the patients seem happy, and the nursing leaves nothing to be desired in both establishments. There is a complete absence of officialdom and red tape, while the time of the staffs is wholly occupied in the treatment and welfare of the patients, and is not taken up by the signing of unnecessary papers, &c.

The drainage of both the Government Hospital and the English Hospital is the same, viz., the bucket system for sewage, the buckets being daily removed, and pits for dirty water. The water supply is the same also, viz., the town water, which is boiled and filtered. Milk supplied to both establishments is sterilised. An examination of the accompanying map will show the respective positions of these two hospitals. The wooden English Hcspital stands alone on the sea front, but is raised from the sand by piles and is not surrounded by walls, but exposed to the wind, which blows through its wards; while the other hospital is built solidly of stone and is surrounded by a high stone wall and contains in its enclosure many trees. This hospital stands back on the edge of the town, is surrounded by houses, and its wards are not exposed to the wind. This, then, is the difference between the two establishments. In the Government Hospital, the grounds of which contains trees, and is surrounded by houses, and is not exposed to the wind, Mediterranean fever is

endemic; while in the English Hospital, which is exposed to the wind and to dust, Mediterranean fever does not exist, or, at all events, is not endemic.

The ground around the English Hospital is kept constantly polluted by the Arabs, the dust, therefore, must also be polluted. But in this hospital neither the patients nor the nursing staff have ever contracted Malta fever, which is supposed by some to be conveyed in this way. In this respect it is noteworthy that the dust of Port Said consists wholly of sea sand, and there is none of the globigerina limestone dust which appertains to Malta.

Mediterranean fever is regarded by some to be a "filth" disease, whatever that term may mean, but if this be the case, then surely Malta fever would be prevalent in this hospital, which is surrounded by filth, but we know it is not. But in the other hospital, into which dust and filth cannot penetrate, Malta fever is endemic. The only possible solution of this interesting problem may lie in the consideration of the insect-borne theory of the disease. In the English Hospital mosquitoes are comparatively few, for the place is wind-swept, and these insects cannot stand wind; also there is very little water for them to breed in, and then only water suitable for *Culex fatigans* and *Stegomyia fasciata;* there is no stagnant sea-water. But in the Government Hospital, on the other hand, mosquitoes are very numerous; it is not exposed to the wind, so that they can live and bite with impunity, and there is much water, including sea-water of high density in the cesspools of the surrounding houses, where they can pass their larval stages.

I have elsewhere[1] stated the opinion that Malta fever is conveyed by the mosquito *Acartomyia zammitii* (Theobald). If, then, this opinion is correct, this mosquito must of necessity be found in Port Said. On my arrival at Port Said, therefore, I and several others collected as many mosquitoes as possible from different places scattered about the town. These mosquitoes were then classified and counted, but only recently fed females were included, while non-biting flies and midges were disregarded. This means of catching the imagines I thought would be less misleading than the method of collecting larvæ. Mosquitoes caught from all sources were as follows:—

Culices of the Fatigans group	93
Stegomyia fasciata	18
Acartomyia zammitii	5

[1] Journal of the Royal Army Medical Corps, September, 1905.

A. zammitii is therefore present in Port Said. This mosquito can only pass its larval stages in concentrated sea-water, such as that found in salt pans and pools near the sea. The larvæ will not live in the sea itself. There is plenty of sea-water in and around Port Said which will supply them with the suitable water which they require; for example, I found the larvæ in an old tank, under Navy House, which contained sea-water. The sea-water cesspools also contain Acartomyia, as the fresh-water ones do Culex and Stegomyia.

One last point is of great interest. Seven years ago the salt works to the east of the Suez Canal were started. These salt works are very extensive, and consist of many large salt pans containing sea-water of varying density. The following year the first cases of Malta fever occurred in Port Said. By kind permission of the manager I searched these salt pans for larval Acartomyia, but found none; this may be due to the extent of the salt pans, but I think that they are situated too far from the town to be the source of many Acartomyia, which can find suitable water nearer their food supply. I have been informed by Dr. Pressat, the medical officer of the Suez Canal Company, and by Dr. Cresswell, of the Government Hospital, Suez, that Mediterranean fever does not exist in Ismailia and Suez, though these places are in constant communication by rail and steamer with Port Said. Dr. Cresswell states that though some cases have been admitted to his hospital in Suez from Port Said, the disease has never spread. It is noteworthy that in and around these two places Acartomyia is absent, for Dr. Pressat, who has worked at the mosquitoes found in these two places for some years, and whose book on the subject is well known, has never come across this species. Ismailia is now quite free of mosquitoes, though there are still a great many in Suez; but there are no salt pans there, and the cesspools are not nearly so salt as those at Port Said.

The following is a description of an epidemic of Malta fever which occurred in the Government Hospital, Port Said, in March, April and May, 1903. On March 19th the hospital steward was taken ill with Malta fever, the diagnosis being confirmed by Dr. Bitter, the Government bacteriologist at Cairo. The patient was transferred to a special ward in the hospital, and there nursed by three attendants. On March 30th all these three attendants were taken ill with Malta fever. On April 2nd a boy who had been attending on the original patient and taking his meals with

the other attendants contracted the disease. Other cases occurred in the hospital on the following dates: April 5th, 10th, 18th, 21st, May 1st, 9th, and 20th.

It will be noticed, if this epidemic is compared with those which have occurred elsewhere, that like them the cases occurred one after another, not all together, as if they were due to a common cause acting at the same moment. The probability of this epidemic being caused by a mosquito is therefore very apparent, but it differs from some other epidemics in the increased length of time between the onset of each case. This, however, can be explained by the fact that the weather was cold at the time, when the digestive periods of mosquitoes are considerably prolonged.

I wish to thank Sir H. Pinching, Director-General of the Egyptian Sanitary Department, who has given me permission to publish the notes obtained from the Government Hospital; Dr. Orme, the Medical Officer of that hospital; Dr. Betts; Dr. Cresswell, the Sanitary Inspector of Port Said and the Medical Officer of Suez Hospital; also Dr. Cuffey, the Medical Officer of the English Hospital. I am also indebted to Dr. Pressat and to Dr. Cassala for much valuable information. All these gentlemen have gone out of their way to help me to make this enquiry, and to them I offer my best thanks.

A PLEA FOR THE MORE SYSTEMATIC MICROSCOPICAL EXAMINATION OF THE BLOOD.

By Major J. C. MORGAN.
Royal Army Medical Corps.

The microscopical examination of the blood is now in all cases of malarial fever a matter of necessity, and medical officers are expected to diagnose and differentiate such fevers in terms of the various forms of malarial parasite found in the blood. It is not too much to say that, without such examination, no true or accurate diagnosis can be arrived at, for "ague" may be due to the presence of either the benign or malignant tertian parasite, and inasmuch as all cases of "24*a* ague" require to be differentiated as either benign tertian, malignant tertian, or quartan, this cannot in the majority of cases be done with any accuracy, unless a microscopic examination of the blood has been carried out and the parasite found, if present; for although it is possible to form some sort of conclusion from the temperature chart alone, still a purely clinical diagnosis cannot have the same weight or give the satisfaction to the diagnostian that a positive result obtained by the microscope can and does.

Further, the interest and importance of the subject does not seem to be as widely known or appreciated as it should be among us as a Corps, and now the provision of Leishman's method of staining the blood films has made the examination of specimens so simple, easy and effective, that, given access to a high power microscope, there is no reascn why every medical officer should not make and examine blood films for himself from all cases of "fever" that present themselves.

Indeed, I might almost say that an examination of the blood from a diagnostic point of view is quite as important, if not more so, than the taking of the temperature, and as a large percentage of all cases that one gets out here (India) are cases of "fever" of some sort or another, the importance of the routine examination of the blood cannot be over-rated, and I venture to say will add greatly to the clinical interest of all such cases.

I am given to understand that a good and up-to-date microscope will shortly be available for use in every Station Hospital in India, a consummation devoutly to be wished.

In this paper I therefore propose discussing briefly the formed

elements of the blood and giving the results of such short experience as I have had in the hope that it may be of some practical use to others. It will, I think, be of service, therefore, to first very briefly review the component parts of the blood and the life history of the chief forms of white corpuscles which we meet with in the ordinary blood film.

The accompanying plates will help in explaining the various types—they have all been drawn by a native artist from specimens taken by myself and stained with Leishman's stain.

General Composition of the Blood.

The blood then is a tissue, consisting of a fluid holding in suspension certain corpuscular elements. Of its total volume the former consists of three-fifths, the latter two-fifths. It has been stated that the total quantity in the normal individual is about one-twelfth of the body weight. The fluid element, known as the plasma, is an alkaline, yellowish liquid, with a sp. gr. of from 1026-1029 and containing approximately 10 per cent. of solids, of which three-fourths are proteids consisting of serum albumen, serum globulin and fibrinogen.

The formed elements of the blood or corpuscles are free cellular bodies contained in the plasma. They consist of two varieties: (*a*) erythrocytes or red corpuscles; (*b*) leucocytes or white corpuscles. In addition to these we also find blood platelets and bodies known as hemokonia or blood dust, and which are often seen in wet films. These latter are not supposed to have any definite clinical significance, though they may often be seen in wet films as minute, highly refractile, rapidly motile bodies giving the appearance of minute micrococci.

The salts of the blood consist of potassium and sodium chloride, sodium carbonate and phosphate, calcium phosphate, &c. Certain extractives are also found, of which the chief are urea, uric acid, creatin, creatinin, and other purin bodies, as also sugar, fats, &c.

The gases of the blood consist of oxygen, nitrogen and carbon dioxide, the oxygen contained chiefly in the erythrocytes in combination with hæmoglobin, the CO_2 as carbonates, the nitrogen in simple solution.

Life History of the Erythrocytes.

In the Embryo.—(1) In the vascular area in a developing embryo you find irregular cells with many nuclei (angioblasts), these will give rise to the red corpuscles. (2) The liver probably forms some

in the fœtus. (3) In the loose connective tissue in rapidly growing animals from irregular cells there are some which are probably analogous to the angioblasts.

In the Adult.—In the human body a constant manufacture of erythrocytes is going on in health to make up for the continuous destruction of those that have played their part and become useless, and it is generally conceded that such manufacture takes place mainly in the red bone marrow, the fully formed red cells being developed from their erythroblasts or nucleated red cells that exist in large numbers in red bone marrow. It is also supposed that some are formed in the spleen and in the lymphatic glands, though this is open to doubt, while some authorities consider that they may be transformed from the leucocytes in the circulating blood. For us, however, it is sufficient to say that the red cells come from the red bone marrow, which is the chief, if not the only, source of manufacture.

Where are they Destroyed?—This is supposed to be *firstly in the spleen.* The preliminary "squeeze" in the spleen means less intimate relation between the hæmoglobin and the stroma, and some are doubtless destroyed there, as is shown by the fact that you can recover iron from the spleen in organic combination—albuminate of iron.

Secondly, in the Liver.—The blood is then pumped up to the liver, and it completes the destruction, and here again we find iron in organic combination. The average diameter of a red cell is about 7·5 micro-millimetres, its average thickness about 1·8 micro-millimetres. The normal number is approximately 5,000,000 per cubic millimetre of blood, and about 4,500,000 in the female. The proportion of white to red is normally about 1 to 700. Seen under the microscope the red cell appears as a round bi-concave disc, stained either a faint pink or greenish-blue by Leishman's stain.

Life History of the White Corpuscles.

There are two views at present as to the origin of the white cells: (1) That of Ehrlich and his school; (2) that of Uskow and the Russian school. According to Ehrlich, the small lymphocyte and its mother-cell, the large lymphocyte, are developed in the lymphatic tissues. The large mononuclear is thought to be probably of myelogenous origin. The polymorphonuclear neutrophile leucocyte from the bone marrow, from neutrophilic myelocytes there. The eosinophiles from eosinophilic myelocytes, and the basophiles from basophilic myelocytes, also from the bone marrow.

The above is the generally accepted view of the origin of the white cells, and as it would only confuse the issue to go into the alternate view, I propose leaving that of Ehrlich as the only one holding the field at present.

Where are they Destroyed?—It is generally agreed that here again it is mainly the spleen that is the Golgotha of the white cell, though to some extent destruction also takes place in the liver, and also, according to Lewis, the hæmolymphatic glands have a similar function by reason of their phagocytic power.

Varieties.—There are six main varieties of leucocytes that may be seen in an ordinary blood film as stained by Leishman's stain, and of these four are generally present in good number. They may be conveniently divided into two main groups: (*a*) the simple nuclear group; (*b*) the polymorphonuclear group.

To describe in detail: (1) The polymorphonuclear finely granular neutrophilous leucocyte. Of these the blood contains from 60 per cent. to 80 per cent., and this is the one that exhibits marked amœboid movement; (2) the polymorphonuclear coarsely granular eosinophilous leucocyte (the eosinophile), of these the blood contains from ½ to 3 per cent; (3) the small lymphocyte, of these about 20 per cent. to 30 per cent.; (4) the large mononuclear lymphocyte (the mononuclear); of these about 4 per cent. to 8 per cent.; (5) transitional forms; (6) basophiles; of these last two a small percentage. It is with the first four that we are mainly concerned, and of these Nos. 3 and 4 are of the highest importance in the diagnosis of malarial fever and enteric fever.

It will further be noted that the classification is based on two considerations: firstly, the appearance of the nuclei of the cells; and secondly, on their staining affinities. The above relative proportions are those that obtain in health; in disease we find often a marked increase in one or other of these varieties. Those that chiefly concern us here are, however, the relative increase in the large mononuclears that takes place in malarial conditions and in cachexial fever, and the frequent increase of the lymphocytes that occurs in enteric fever without any large mononuclear increase.

It is mainly to Captain Leonard Rogers' work that we owe the establishment of the importance of this latter fact. The same writer has recently stated that "cachexial fever" differs from true malarial cachexia, in that in the latter both the red and white corpuscles are equally reduced in numbers, whereas in the former the white are disproportionately decreased in number. He regards a ratio of less than 1 white to 1,500 red as diagnostic of the fever

due to the Leishman-Donovan parasite. Should this be confirmed it will prove a simple and valuable aid in differentiating obscure fevers by the finger blood without recourse to spleen puncture.

A general leucocytosis of course takes place in many inflammatory conditions and also in certain physiological states, and in India one often finds, in examining the blood of native children, an eosinophilia, said to be due to the presence of intestinal worms.

Functions and Significance of the Leucocytes.

Let us now consider for a moment what are the functions of these white cells?—what their significance?

(1) They aid in the coagulation of the blood, *i.e.*, the eosinophiles.

(2) They help to repair damaged tissues.

(3) They are the great carriers of the body; (*a*) they carry glycogen; (*b*) they carry iron, from the liver to the bone marrow; (*c*) they carry fat, from villi to central lacteal; (*d*) they carry dirt particles (scavengers); (*e*) they kill micro-organisms and carry off the dead material.

(4) They reproduce new corpuscles.

(5) They may help in the destruction of the red and take off the hæmoglobin to build up new red cells.

(6) The eosinophile is supposed to be a sort of "wandering gland;" its large granules suggest this.

(7) They produce a chemical body, or rather bodies, known as alexins, which act as antitoxins and aid in producing a condition of immunity.

Technique.

Having given the above brief description of the tissue with which we have to deal, I now pass on to the method of obtaining specimens for blood examination. There is a right and a wrong way of doing most things, and my short experience in the District Laboratory has given me abundant proof that the method of making blood films is still unknown in many quarters; for I have had blood sent in "Wright's pipettes" for examination for malarial parasites, and, *per contra*, dried films to carry out a quantitative Widal reaction.

I hope, therefore, that a few remarks on the proper and easiest method will not be out of place.

Leishman's stain can be obtained made up in accordance with his directions as contained in the Corps Journal for June, 1904;

from Messrs. Ball, Hobson and Co., chemists, Umballa; and from Messrs. Smith, Stanistreet and Co., chemists, Calcutta, at Rs. 1.6.

It will be found convenient to get two or three drop bottles for the stain and distilled water.

To obtain good films that are a pleasure to examine and hunt for parasites (for a half hour's hunt is often necessary before a positive result is obtained), it is essential that the slide and cover-slip be absolutely clean and free from grease. A little time and trouble spent to ensure this is well repaid by the beauty of the films obtained and the subsequent ease in examination.

The best method of securing this is to boil the slides and cover-slips in *van Ermengen's solution* (pot. bichromate ℥j., acid. sulph. conc. ℥j., water ℥xx.) for twenty minutes; this must be done in a porcelain or stone-china bowl, not in metal, and then well wash in water, and preserve in spirit; an empty small prune-jar or glass jam-jar with screw lid is excellent for the purpose, with a wide-mouthed stoppered bottle for the cover slips.

It will be found convenient to have these on a small tray, a Japanese papier maché tray answers well, together with a small spirit lamp, two straight surgical needles, a small bottle with alcohol and one with ether (spts. etheris), and an old handkerchief or clean rag, also a small pot of vaseline and a camel-hair brush, and some small labels. Clean the pulp of the finger with soap and water; and then, with a corner of the handkerchief dipped first in the alcohol and then in the ether, sterilise your needle in the spirit flame and take your specimen. Always wipe away the first drop of blood, and then take two dry specimens and a wet one. I find it, in this climate at any rate, a good tip to just pass the slides rapidly through the spirit flame to clear off all moisture before taking the sample. The usual directions for making a film in the easiest and simplest manner are to gently touch the apex of the drop of blood with the glass slide towards the end, carefully avoiding touching the skin with the glass slide or the surface of the slide with the fingers. Then lay the needle transversely across the slide and allow the drop to travel by capillarity along it, and then glide the needle along the surface of the slide and allow the film to dry in the air. The smear should not extend to the extreme edge of the slide but leave a margin. It is along the edge of the film that one has the surest and quickest "find" for infected corpuscles. Ring your wet specimen at once with vaseline and label and date your slides.

Manson says one should take half a dozen slides, but where

one often has several cases to take samples from in a morning, I find two good and well made clean specimens and a wet film as much as one can cope with. Then stain with Leishman's stain as directed: Pour on four or five drops of stain first, and then after half a minute, double the quantity of distilled water, mixing stain and water by gently rocking the slide; leave for five minutes, during which time you can be examining your wet specimen, wash off stain with distilled water and allow a little of the water to rest on the film for half a minute, and dry with a piece of blotting paper. The taking of a wet film should never be omitted, as its examination is most instructive and important.

I now pass to the consideration of the malaria parasite, its life history and varieties. It seems scarcely necessary to say that it has been incontestably proved that malarial fevers are due to the presence in the blood of a *protozoal* parasite belonging to the class Sporazoa known as the *Hæmamœbidæ*; that these were first discovered by Laveran in 1880 and then shown by Ross and others to obtain access to the human body by the bites of certain species of Anopheles mosquitoes; that the parasite has a sexual cycle, the cycle of Ross, in the mosquito, and an asexual cycle, the cycle of Golgi, in man; and that the various types of fever, the so-called quotidian, tertian, quartan, remittent, irregular, &c., depend upon the sporulation of the various species of parasite infecting the blood; and that the irregularity, intermittency or remittency of a given case depends upon the simultaneous or non-simultaneous sporulation of the infecting parasite or parasites.

Put briefly, there are three chief varieties of malarial parasite, giving rise to fairly well defined types of fever which we meet with every day in India. These are:—

(1) *The Benign Tertian*, with a periodicity extending over forty-eight hours, due to infection by the *Hæmamœba vivax*. In the great majority of cases there is, however, a double infection, with a resulting daily rise of temperature.

(2) *The Malignant Tertian* (or æstivo-autumnal), an irregular type, due to infection by the *Hæmamœba præcox*.

(3) *The Quartan*, with a periodicity extending over seventy-two hours, due to infection by the *Hæmamœba malariæ*.

The first two are of every-day occurrence, the third not so common in most malarious places.

We will suppose that the slide we are about to examine is one from a case of benign tertian infection, the ordinary "ague."

On examining the wet film we will notice in the interior of a red cell a moving, glistening body of a pearl grey colour.

It will be seen that, while most of the red cells are motionless, this infected one is moving about, vibrating by the motion communicated to it by its contained parasite, and this fact will help to rivet one's attention at once; and on carefully focussing, the diaphragm should be stopped down and the condenser lowered, it will be seen that the body in the red cell is in active motion, constantly changing its shape and throwing out and retracting pseudopodia. This is the intracellular hyaline form, or amœbula.

Examining a little further one finds an apparent very pale, somewhat large red cell, and in it minute particles of dark brown pigment which are in active motion, dancing about and shaking the containing red cell in a manner that absolutely fascinates the observer.

Some will be seen in which the containing red cell is completely decolorised, perhaps as large again as an ordinary erythrocyte, and filled with these pigment granules. This is the intracellular pigmented form, and the pigment has been formed at the expense of the hæmoglobin of the red cell. This condition is that which obtains just before sporulation takes place, and coincidently with this the segmenting forms of the parasite, the sporocytes, begin to appear in the blood. The spores which have been up to this time contained in the red cell escape by the rupture of the red cell and are now ready to infect fresh erythrocytes and so start a fresh cycle of development.

The pigment granules are carried off by the leucocytes, and most of them are deposited in various organs, such as the liver, spleen and intestinal wall—some being retained in the large mononuclears, giving rise to "pigmented leucocytes."

The stained films will show the various stages in the development of the parasite such as are depicted in the accompanying plate.

The Parasite of Malignant Tertian or æstivo-autumnal fever—Hæmomenas præcox *of Grassi*—Hæmamœba præcox.—

The striking feature about these is their inconceivable minuteness, the "small rings" are in some cases so minute as to escape notice unless carefully looked for. Unlike the benign tertian, which can be easily seen by a Zeiss D or one-eighth lens, these require a high magnification.

Further, when seen in wet films, but as is best shown in stained specimens, they mostly seem to stick on to the edge of a red cell or else lie well to the side—that is, eccentrically in the containing cell. Then the pigment granules are not so numerous,

PLATE I.—BENIGN TERTIAN.

A composite field from two cases of benign tertian infection. Magnification: Zeiss' one-twelfth oil immersion objective. No. 4 ocular, Tale length. About 1,200 diameters.

(*A*) In the lower part of the field, note :—

(1) A large eosinophile leucocyte. The large granules have in this example hardly the bright rose pink colour they generally take on.

(2) To its right, a polymorphonuclear leucocycte. Note the fine filament of nuclear protoplasm joining two larger portions of nucleus.

(3) To its left—note the very characteristic large mononuclear leucocyte with a kidney-shaped nucleus and fair amount of light blue protoplasm.

(*B*) In the neighbourhood of "six o'clock," note :—

(1) A red cell, much enlarged and altered in shape, containing a nearly mature form of benign tertian parasite. Especially note the presence of Schäffner's dots, only seen in benign tertian infections. Said to be altered hæmoglobin pigment. Immediately above this note :—

(2) A "sporocyte," a fully mature segmenting form with large scattered granules arranged in a racemose manner, or like a piece of tesselated pavement.

(3) To the left of these a large mononuclear is seen: note the large lilac-coloured nucleus with margin of pale blue protoplasm.

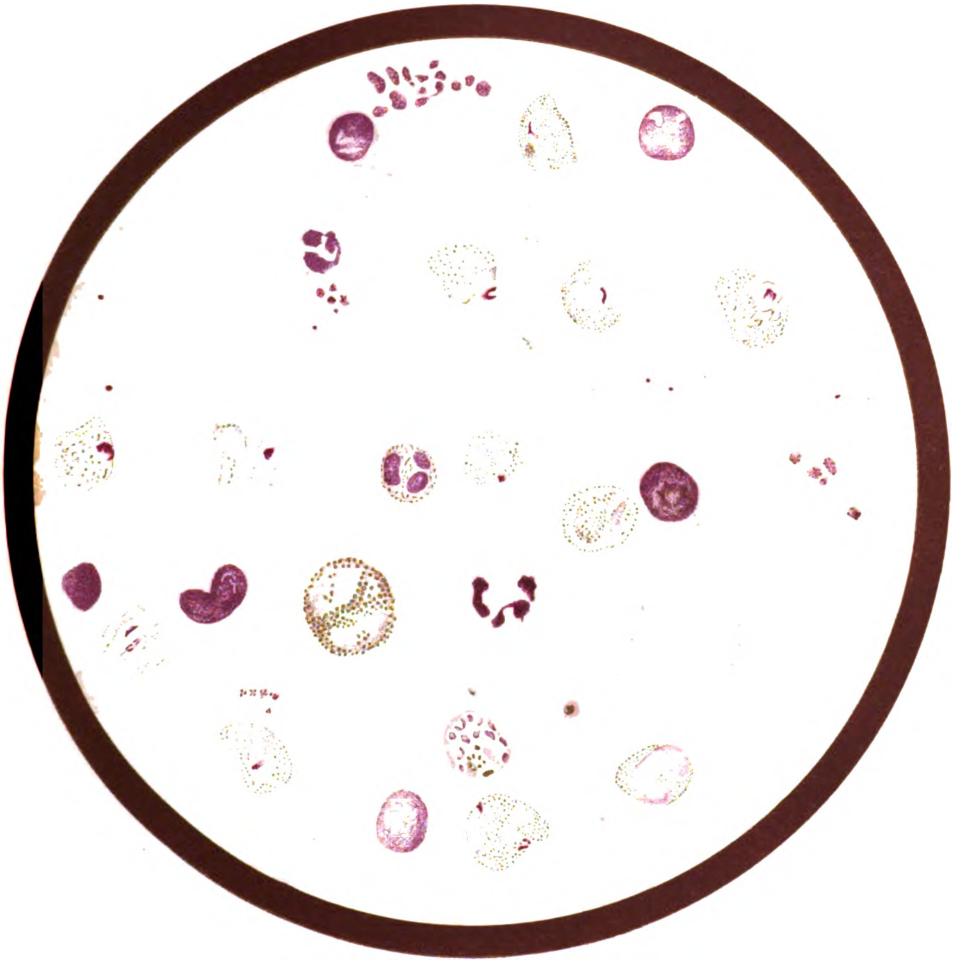
(4) A transitional form with a well-marked indented crescent-shaped nucleus with rounded ends, all quite characteristic, is well seen to the right, about "five o'clock."

(*C*) In the upper margin of the field note two small lymphocytes, nucleus deep lilac and fine margin of pale blue protoplasm. One has a part of the protoplasm drawn out into a point during the making of the film.

A group of platelets near these is well shown, and other groups are scattered over the field. Note a single platelet lying in the concavity of a red cell, often seen in stained films and apt to give rise to confusion.

(*D*) Dotted over the field are many early ring forms; note one red cell especially with a double infection. Also various more mature forms are shown with the containing red cell much enlarged and altered into all sorts of fantastic shapes, with the protoplasm of the parasite spread out in an irregular flimsy manner, some showing Schäffner's dots well-marked, and also well-marked chromatin granules.

PLATE I.



To illustrate paper by Major J. C. MORGAN.
"A Plea for the more Systematic Microscopical Examination of the Blood."

Bale & Danielsson, Ltd., Lith.

but appear blacker than the benign tertian ones. The stained specimen also shows that many of the infected cells are crenated, and this crenation when seen in the fresh film gives the cell a sort of prickly appearance which is quite distinctive; this is, however, to be carefully distinguished from the crenation that all the erythrocytes undergo when a wet film is kept for some little time.

About a week to ten days after the initial infection crescents begin to appear in the blood. These are, of course, diagnostic of the malignant tertian infection. They represent the gamete form of the parasite, and are of intracellular origin; the remains of the capsule of the red cell can often be seen as a sort of fine string to the bow of the crescent. These crescents persist in the blood for days after the subsidence of the fever, and quinine has no effect on them. I have given as much as 12—20 grains of quinine hypodermically to cases with crescents, and taken samples every day, and still found them after a week of this treatment, lessened in numbers, no doubt, but still persisting.

In the crescents the pigment is usually arranged in a solid mass in the centre of the crescent, and as a rule also shows motility. In the male the pigment is more scattered than in the female, in which it is usually arranged in a circle in the centre of the crescent body.

The Parasite of Quartan Fever, Hæmamœba malariæ.—

Of this form I have seen none in my wards, and as I have wished to give mainly an account of what I have seen myself, I will but state that in quartan infections the hyaline form is similar to that of the benign tertian, the pigmented form more distinct, the pigment granules not so motile, and coarser, like rods and needles; its cycle of development is exceedingly regular. There is no increase in the size of the red blood cell, and no Schäffner's dots in the stained film. In this form the beautiful symmetrical daisy formation of sporocyte, the "rosette," is seen to perfection.

Pigmented Leucocytes.

When quinine has been systematically given as a prophylactic it is then difficult or impossible to find any parasites in the peripheral blood, but here we find that the increase in the large mononuclears, which is most marked in benign tertian infections, is a diagnostic point of great value, and further, we may see some pigmented leucocytes which confirm the diagnosis.

In tertian infections the large mononuclear and the polymorphonuclear neutrophilous leucocytes are the chief phagocytic agents,

PLATE II.—MALIGNANT TERTIAN.

A composite field from two cases of malignant tertian infection.

Drawn under the same condition as Plate I.

Note:—(1) About the centre of the field a large mononuclear is seen containing pigment granules.

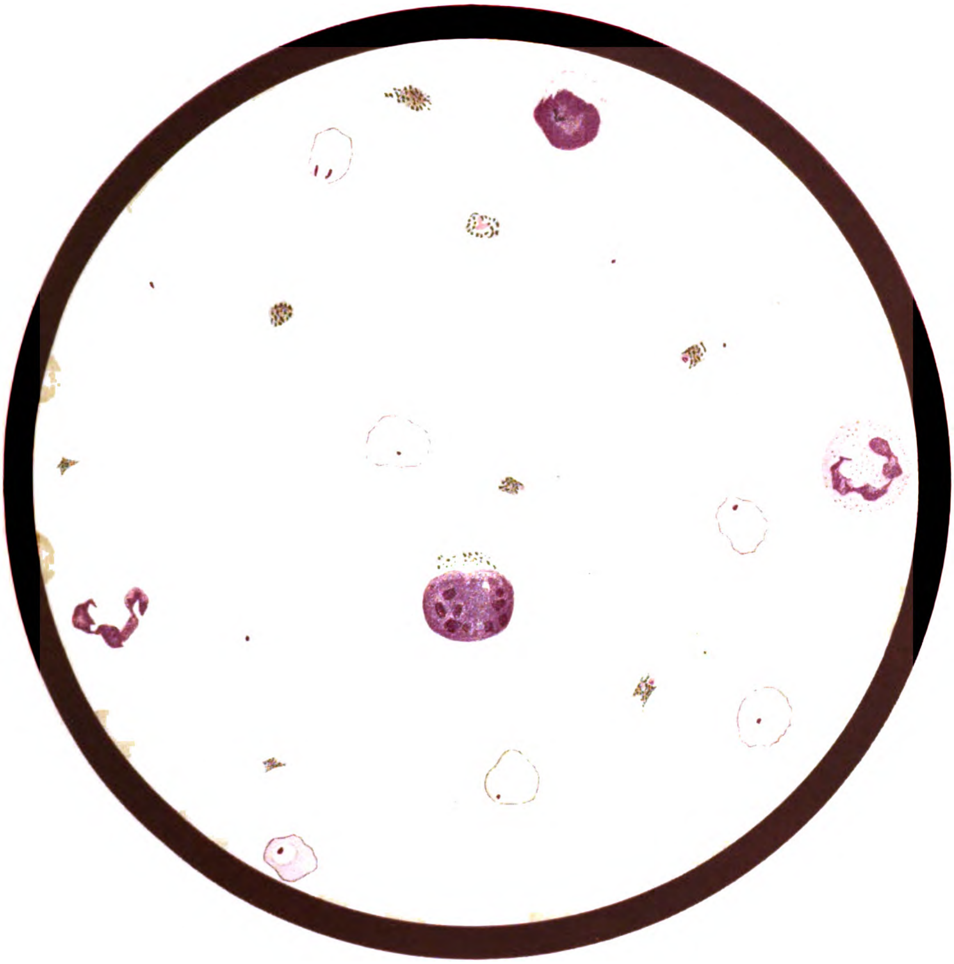
(2) On either side of the field near the margin are two polymorphonuclear leucocytes. Note again the fine filament of protoplasm joining two portions of nucleus, giving colour to the supposition that the multipartite nucleus is in reality all one corporate body.

(3) Note the minute rings in the infected red cells with the characteristic crenation of some of the latter. Especially notice one with a double chromatin dot lying in the upper margin of the field; and further, one in the lower right margin with a double infection, the second ring so minute that the artist has only been able to draw it more or less diagrammatically but nevertheless faithfully as regards size.

(4) Many crescents are scattered about; note one especially with a chromatin dot at one end.

(5) Looking only at some of the young ring forms in these two fields, it would be hard to say definitely whether they were benign or malignant forms, but it must be noted that in the malignant infections they are all "small rings"; no large forms are usually seen, such as is almost invariably the case in benign tertian; and further, with a little experience the rings can be differentiated, for they really are as a whole much more minute than the young rings of benign.

PLATE II.



To illustrate paper by Major J. C. MORGAN.
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Bale & Danielsson, Ltd., Lith.

and in examining wet films one may sometimes see a polynuclear flow round and gradually engulf particles of free pigment, and even the sporocytes, thus fulfilling under one's direct observation one of their functions as previously noted, a most interesting sight to watch.

In opening this paper I said that the subject was to us one of great interest and importance. We have still much to learn about malaria, its causation, propagation and treatment, and if I have been able to show that the preliminary steps are at least simple and interesting, it may stimulate others, abler and younger men than myself, to work at the question, for the field in India is large and still virgin in many respects.

I am aware that in most stations in India one's hands are tied by the want of a good high-power microscope to carry out the necessary blood examinations, and good microscopes are expensive luxuries; still, I can safely say that money spent in getting one is well repaid by the interest and pleasure derived in studying so complex and beautiful a structure as is the subject of my paper.

Nowadays, when the clinical examination of the blood is of such diagnostic help and importance in every-day work, the means of carrying it out as a routine measure in a thoroughly efficient manner will doubtless soon be available for the use of every station hospital in this country. To those desirous of a full and complete account of our knowledge of clinical hæmatology, I can commend Da Costa's splendid work on the subject, to the pages of which I am indebted for many of the facts and figures entered in this paper.

Clinical and other Notes.

GUNSHOT WOUND OF THIGH.

By Lieutenant W. HYDE HILLS.
Royal Army Medical Corps.

A somewhat curious accident occurred in July last at Edale Camp, where a regiment was undergoing a course of field firing. A party was advancing in extended order towards the targets when one of them, Private A., stopped to adjust his bootlace, placing his loaded rifle on the ground. Meanwhile the rest of the party had advanced some twenty

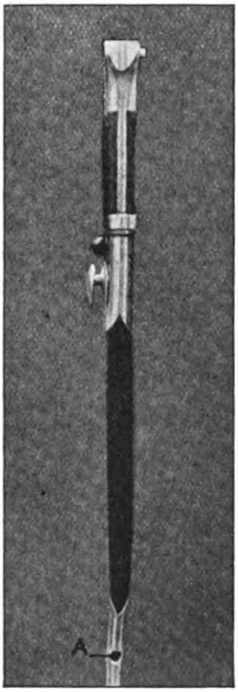

Fig. 1

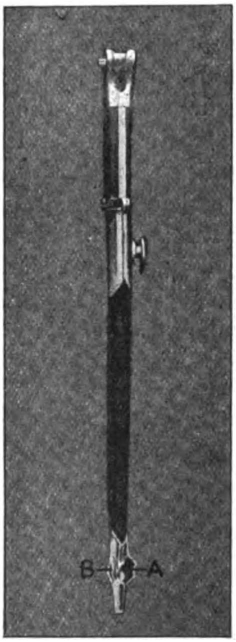

Fig. 2.

yards. On picking up his rifle, Private A. in some way pulled the trigger and shot Corporal B. in the firing line. On my arrival I found a small punctured wound in the outer aspect of the left thigh, and discovered later that it passed directly inwards for about three inches, terminating just in front of the femur.

Corporal B.'s bayonet scabbard presented a curious appearance. There was a small, clean-cut hole in the back of the metal tip of the scabbard about two inches above the extremity (fig. 1, *a*). Two holes were found in front, both of irregular outline, the larger on the outer side of the scabbard-tip (fig. 2, *a*), and the smaller on the inner side (fig. 2, *b*), adjacent to the man's thigh. The point of the bayonet had a nickel mark on it, corresponding in position to the hole at the back of the scabbard. Thus the bullet had entered the back of the scabbard and been split on the point of the bayonet into two portions. One of these entered Corporal B.'s thigh, and the other flew off at an angle of about 120°, passing dangerously near the head of an officer standing some way to the left of the firing line. A portion of the nickel casing of a bullet was subsequently removed from Corporal B.'s thigh at the Military Hospital, Derby.

TWO CASES FROM THE EYE WARD OF THE ROYAL HERBERT HOSPITAL, WOOLWICH.

By Major H. V. PRYNNE.
Royal Army Medical Corps.

Case 1.— Gunner G. W., aged 19, service five months. Admitted September 29th, 1903, complaining of complete loss of sight in right eye. The disability was stated to have developed in the course of twenty-four hours, three days previous to admission.

Present Condition.—Ptosis of right upper lid, movements of eyelid on left side normal. Muscular movements of both eyeballs normal. Right pupil somewhat dilated, insensitive to light, not reacting to accommodation, but active upon consensual stimulation. Pain was said to be present on right side of face, but no definite anæsthesia existed. Patient stated he had suffered from "sore throat" three weeks before admission. Palate reflex normal, and knee-jerks brisk. Vision of right eye entirely absent, and this confirmed by prism test. Vision of left eye $\frac{6}{12}$.

Ophthalmoscope.—Right pupil fixed and insensitive. Retinal veins of both eyes enlarged and tortuous, especially marked in the case of left eye.

On October 4th, 1903, patient began to complain of vertical headache, paroxysmal in character.

On October 7th, 1903, atropine was instilled into left eye, and the refraction estimated.

On October 10th, 1903, patient complained that the sight of left eye had failed completely since the previous evening. Vision of left eye was found to be *nil*, and the pupil dilated and insensitive to light. The fundus conditions in the two eyes appeared unchanged. Headache was now frontal in position, fairly continuous, and kept him awake at night, and orbital pain was also present. Patchy and transient anæsthesia and

hyperæsthesia over body and face, with delayed sensation in feet, exaggerated knee-jerks, normal plantar reflex, and absence of ankle clonus were noted.

On October 12th, 1903, slight paresis of right internal rectus was present, and patient commenced to suffer from slight attacks of epistaxis. No vomiting occurred, and the urine contained neither albumen nor sugar. A soft growth was felt in the naso-pharynx.

On October 24th, 1903, the condition had not markedly altered, except that the pupils were slightly smaller, and the edges of each optic disc blurred and indistinct. The pain in face was more constantly referred to the infra-orbital region, where sensation was deficient.

On October 28th, 1903, headache, with pain in eyes and face, were the main symptoms, and there was a patch of permanent anæsthesia by right side of nose and upper lip. It was now noticed that patient had developed seven small, hard swellings, subcutaneous and freely movable. These swellings gradually became congested on the surface, and came to resemble nævoid growths. One growth was situated on the right side of abdomen, about three inches from middle line; one over sixth left rib; one over sternal end of right clavicle; one over left back near vertebral column, opposite twelfth dorsal spine; one over vertebral end of spine of left scapula; one over left supra-spinous fossa, and one one and a half inches below centre of left iliac crest.

On October 31st, 1903, some prominence of right eye was noted. Lungs and liver appeared normal.

On November 5th, 1903, a posterior rhinoscopy was made, and showed a soft vascular growth involving the basi-sphenoid and posterior end of vomer, and projecting into right nostril.

On November 9th, 1903, one swelling was found to have increased from six-eighths of an inch to one inch in diameter.

Since October 28th, 1903, all the swellings were marked on the surface by bluish discolouration. The prominence of right eye was fairly well marked.

The case had been repeatedly seen throughout by Lieutenant-Colonel Whitehead and Lieutenant-Colonel Hickson, and a diagnosis of malignant new growth was accordingly made.

The boy's father was informed, and by special sanction the boy was allowed to be taken to his own home. The further notes of the case were furnished me by Dr. Walter Groome, of Lewisham, who also gave me a specimen of the growth. His condition grew worse with the extension of the neoplasm. The right eye was nearly protruded from the orbit, and the spread of the growth down the pharynx interfered with deglutition and speech. He died on December 9th, 1903, and the *post-mortem* examination revealed an extensive growth from the basi-sphenoid, which had entered the cranium by the sphenoidal fissure, and also passed

forward into the orbit. The sudden onset was due in each case to hæmorrhage from the growth.

Mr. N. Bishop Harman, of Middlesex Hospital, kindly cut sections of the growth, and reports it to be a small, round-celled sarcoma with many spaces, thin walled blood-vessels, and hæmorrhages. It is of a most malignant variety, as in this case death was caused in ten weeks from the onset of symptoms.

Case 2.—Dr. H., age 33, service twelve years and six months. Admitted November 23rd, 1903, complaining of dimness of vision, especially at night. Right vision $\frac{6}{12}$, left vision $\frac{6}{12}$. Hm. in both eyes ·5. Vision not improved by glasses.

Fundus.—In each eye showed a general dull reflex, and appeared darker than consistent with his colouring. One or two spots of peripheral pigmentation. Discs looked whiter than normal by contrast. Refractive error very slight.

On December 12th, 1903, patient was noticed to have a few petechial spots on chest; the gums were spongy, and patient stated he had eaten no vegetables for two and a-half years. He was ordered vegetables and lime-juice, and chloride of calcium was given internally.

On January 2nd, 1904, right vision = $\frac{6}{6}$, left vision $\frac{6}{6}$; dimness of vision at night had quite disappeared, and patient was discharged to duty.

AN UNUSUAL CASE.

By Captain W. A. WARD.
Royal Army Medical Corps.

I am induced to record the following case by reason of the unusual nature of the injury and its ultimate recovery.

When doing duty at an Indian Station, in 1903, I was one afternoon taking part in a paper-chase. At the finish, a Major of a British Cavalry Regiment was missing, and someone remembered seeing him fall at a small water jump about three miles away. Another officer went to help him, and found him walking slowly and holding his handkerchief up to his left ear. He stated that he had had a fall and had hurt his ear, and must have been unconscious for a short time, as he remembered nothing about it. He had to walk about four miles to the Station Hospital, where I saw him about two hours after the accident. On removing the handkerchief which, as well as his coat, was covered with blood, I saw that the whole of the external ear was cut off, almost as clean as if cut with a razor, and was merely hanging by a thin thread of skin at the lower angle. The wound was very dirty with bits of grass and mud. The patient was rather blanched and weak from loss of blood. At first I thought it was useless to attempt to sew it on; then I considered that

there could be no harm in giving it a chance, but the patient refused an anæsthetic, and after each stitch begged me not to go on, and that he would rather not go through the pain, with only a small chance, if any, of success. I begged him, however, to let me try, but it was with great difficulty that I could insert a stitch. After an hour I had it fairly well in position. It was then irrigated with warm boracic lotion, also with boiled warm water, and sterile dressings applied. A pad was put behind the pinna to keep it in position, and large pads of wool applied and bandages. I did not remove the dressing for three days, then only very carefully, to see how things were. The ear was a very dark blue colour, almost black, and quite insensitive. The dressings were a good deal blood-stained, with a little discharge. Some of this was carefully removed and clean pads applied. On the sixth day the dressings were again carefully removed, and the ear looked a better colour, especially the upper part; there was no sensation. A few stitches were removed. I irrigated it very carefully with warm boiled water and re-dressed it. On the tenth day the ear was of a much better colour and the circulation was clearly established. The patient stated he felt "pins and needles" in it, and the stitches were removed. From this point the progress to recovery was uninterrupted, except for a small area at the lower part where the flesh was much contused, which sloughed off and granulated. At the end of five weeks the ear was completely healed, and now, unless attention is called to it, a casual observer would not notice anything wrong. As to how the ear was cut off, no light can be thrown, unless it was by the horse's hoof, but there was no mark whatever on the face.

Echoes from the Past.

A MEMOIR OF THE LATE SIR GEORGE BALLINGALL.

(PROFESSOR OF MILITARY SURGERY IN THE UNIVERSITY OF EDINBURGH).

BY GEORGE A. BALLINGALL, M.A., M.D., &c.
St. Leonards-on-Sea.

IT has been suggested to me that a short account of the life of my grandfather, Sir George Ballingall, who for nearly thirty-two years occupied the only University Chair of Military Surgery in this country, might be of interest to the readers of this Journal, so I have endeavoured to set down such facts as I have been able to collect about his career.

George Ballingall was descended from a Fifeshire family who for many years had a farm called Frier's Miln, near Strathmiglo, and were probably of French origin, as the name is derived from an old French word Balingar, frequently used in Froissart's Chronicles, and meaning a flat-bottomed boat used in the transport of troops. His father, the Rev. Robert Ballingall, was minister of the parish of Forglen, in Banffshire, where Sir George was born on May 2nd, 1786. He received the early part of his education at the Parish School of Falkland, in Fifeshire, and afterwards attended four literary sessions at the University of St. Andrews, in which town he also served his apprenticeship to the late Dr. Melville. Of that period I possess an interesting memento in the shape of a large ring, of oval shape, in which is set a polished uric acid calculus, with an inscription on the back stating that it was removed by Dr. Melville in 1790, and probably presented by him to his young pupil. The latter then proceeded to his formal studies at the University of Edinburgh in 1803, where he was, for a time, assistant to Dr. Barclay, a well-known lecturer on anatomy. Dr. Ballingall entered the Army in May, 1806, as Hospital Mate (to use his own words) and was afterwards Assistant-Surgeon to the 2nd Battalion of the Royal Scots, or First Royal Regiment of Foot, which he accompanied to Madras, either in that or the following year. This proved a most fortunate circumstance for him, as the Duke of Kent happened to be the Colonel of the regiment, and His Royal Highness became interested in the young surgeon, and showed him great kindness, not only during his connection with the First Royals, but

up to the time of his death. In 1811 he volunteered into the 22nd Dragoons, accompanied the expedition against Java, and was present at the capture of the island in August of that year, for which service he received a medal. He returned to Europe in 1814, and in 1815 joined the Army of occupation in Paris as surgeon of the 33rd Regiment of Foot. In 1818 he retired on half-pay, being then surgeon to the 10th Regiment, and engaged in private practice in Edinburgh. During this period he took his M.D. degree (which letters first appear after his name in the Army List in 1823) and also became F.R.C.S.E. As he himself says, he had entered the Service before he was even qualified by age to take a doctor's degree. In 1823 he was appointed by the Crown to the then vacant Chair of Military Surgery in the University of Edinburgh, which he continued to occupy until the time of his death. His formal connection with the Army ceased in 1831. On the accession of King William IV., he accompanied a deputation from the Senatus Academicus to London to present an address to the King, on which occasion he was elevated to the dignity of Knighthood. During the last few years of his life he suffered from bronchitis, so that he could no longer stand the rigors of the Edinburgh winters, and was obliged to lecture during the summer. This disease eventually caused his death on December 4th, 1855, at his country residence of Altamont, Blairgowrie, Perthshire, in the 70th year of his age, and thirty-second of his Professorship.

Sir George was Surgeon-Extraordinary to King William IV.; Surgeon to Queen Victoria, and to the Duchess of Kent; Consulting Surgeon to the Royal Edinburgh Infirmary, F.R.S.Edin., F.R.C.S.Edin. (President from October 1836, to October 1838), Hon. F.R.C.S.Ireland, and a Member of the Medical Societies of Paris, Vienna, St. Petersburg, and Berlin.

Dr. James Dunsmure, in a paper read before the Royal College of Surgeons of Edinburgh (and to which I am indebted for much of what I have related above), says of him: " Throughout his long career Sir George Ballingall enjoyed the confidence and esteem of the heads of the different public departments with which he was connected, a circumstance due, not only to his professional knowledge and skill, but also to his upright and gentlemanly deportment in private life. Of this respect he received many substantial tokens, notably a splendid diamond ring from the late Emperor Nicholas, and also a silver dinner service from the medical officers of the Army, Navy, and of the East India Company's Service. His numerous pupils in active duty in all parts of the world joined with his colleagues and

professional brethren in lamenting the loss of one so able and consistent in all his dealings."

Besides his "Outlines of Military Surgery," which was in its day, perhaps, the standard work on the subject, he wrote a book on "Diseases in India," an able pamphlet on "Hospitals," and numerous papers on cases under his care in the Royal Infirmary, chiefly contributed to the *Edinburgh Medical Journal.*

Ballingall's name is not associated, so far as I can find, with any special discovery in science, though his opinion and practice is often quoted in books of the time. His chief aim in life, at which he laboured incessantly, was the improvement of the status and teaching of military surgery. At the time of his appointment to the Chair there was a suggestion that it should be turned into one of general surgery, but Sir George's opposition was so uncompromising that the matter was dropped. The situation is thus dealt with by the *Edinburgh Medical and Surgical Journal* in a review of his book :—

"On the resignation of Dr. Thomson, in 1822, the professorship of Military Surgery was conferred on the author of the present volume, who forthwith proceeded, in the winter of 1823-4, to deliver a course of lectures. Dr. Ballingall had at first to contend with great difficulties, in consequence of a very general impression that lectures on military surgery were superfluous, if not useless; that all the necessary information was communicated by the teachers of surgery generally . . . . These considerations contributed to keep the Chair long in the background; and to a teacher of less perseverance and assiduity might have formed insurmountable impediments. By persevering, however, in delivering annual courses of lectures, by showing his capacity for the task, by collecting, digesting, and publishing whatever information was pertinent to the duty of the Medical Officer, and, above all, by making the course not only of military surgery, but military medicine and surgery in the most comprehensive sense of the term, Sir George Ballingall has succeeded in obtaining for his department of professional study a degree of consideration which it probably never would have acquired by any other mode." I have it from his own statistics that whereas in 1823 he had but four pupils (exclusive of thirty-three officers of the various Services), the number had risen to eighty (all told) in 1839. He was ever ready when any question in military surgery, or for the good of the Service, called for the exercise of his experienced pen. In one of his numerous letters to persons in authority is one to Sir Robert Peel, pointing

out what a scandal it was that there should be officers in the Medical Service—giving cases within his own knowledge—having twenty, twenty-three and even twenty-seven years' service, who were still only Assistant-Surgeons!

Surgery, when Ballingall entered the profession, was rather of the "off with his head!" description, especially in the military department. Excision of joints is alluded to, only to be discarded as impracticable under the then circumstances of warfare, and the symptomatic fever followed every amputation as a matter of course. The thermometer was only a scientific toy, and its bearings on practical medicine unrecognised. The instrument "called the stethoscope" was used by the enlightened few; the majority placed their ear to the bare chest of the patient and thumped his ribs with their finger-tips as a would-be hanger of pictures tries the solidity of the wall with a hammer. The "knife followed the bullet" as speedily as might be, so that the two "shocks" might run into one as much as possible. There were no antiseptics, no X-rays, and, Ye Gods! no anæsthetics! It is difficult for us, nowadays, to realise such a condition of things, and what cast-iron nerves these surgeons of old must have possessed. Such remedies as they knew of were used in no uncertain fashion, and we moderns read with a bit of a shudder of the "blisterings, purgings, and bleedings" that took place. In the "Outlines of Military Surgery" a case is recorded of a young soldier, suffering from acute ophthalmia, who was bled from both arms simultaneously, while standing erect. "To my astonishment," says Sir George, "the young man stood in this situation until *fifty-two ounces* of blood flowed from him, when he fell into the arms of the hospital sergeant who stood ready to receive him. The ophthalmia disappeared for a time, but having recurred next day, the same treatment was repeated; the patient on this occasion fainted on the abstraction of *thirty ounces* of blood; the inflammation of his eyes again disappeared, and did not recur." No wonder that the tentative visit to the wards, which doubtless all of us have made "to see how we could stand it," often ended in those days in the choice of a less strenuous life. Sir George's own elder son so little liked the prospect that he promptly took to a less truculent career—the Army, to wit.

Dr. Lowe, of Coupar Angus, N.B., a hale and hearty veteran now in his 94th year, tells me he remembers Sir George, whose pupil he was, quite well. He was tall and spare in figure, standing just under six feet in height, and of upright carriage, with ruddy cheeks and dark brown hair. According to his portraits, he was

a man of distinguished appearance, with his high forehead, long, straight nose, decided chin, and mouth indicating firmness and an even temper. A kindly look about the eyes, too, though he could be very stern upon occasion. Dr. Lowe says he was particularly amiable, and studiously courteous to all, and that he never saw him out of temper but once. That was when the first death from the cholera epidemic in Edinburgh took place. Doctors came from all parts of the country to the *post-mortem*, but when it commenced, he (Dr. Lowe) took fright and bolted incontinently to the nearest public house, where he had some brandy. At night he felt so ill that he sent for Sir George (whose assistant he then was), who came and gave him a good rating, followed by a sentence of three weeks in charge of the cholera hospital, a line of treatment which worked wonders.

Sir George seems to have travelled a good deal in his time, and was a diligent observer. Besides his service in India and Java, and his journey to see the Czar in St. Petersburg, he spent a whole winter on the Continent (where his name appears to have been well-known) in search of new treatments and ideas. Of his adventures abroad an "Echo from the Past" has reached me. Mr. T. L. Hinton, of St. Leonards (who is probably the oldest M.R.C.S. now living, being in his 98th year), and who came home from Suez with him in 1846, remembers quite well with what respect he was treated by all on board ship, mostly officers returning home on leave from India. The ship was wrecked off Cape Finisterre, and Sir George bewails, in one of his Introductory Lectures, the entire loss of his notes on the hospitals of France, the editing of which had been his winter's work. However, Mr. Hinton remembers with lively feelings of gratitude the happy effect of Sir George's name on the British Consul at Corunna and the consequent comforts shared in by the entire party.

Sir George Ballingall was survived by two sons and a daughter. The elder son, William, entered the Indian Army and became Lieutenant-Colonel of the 24th Bombay N.I. The second, George (my father), also entered the H.E.I.C.S. as Assistant-Surgeon, and became Professor of Surgery in the Grant Medical College, Bombay. He was formerly house-surgeon to the celebrated Syme of Edinburgh, who with his own hands posted the *Lancet* to him every week during his fifteen years' service in India. Sir George's daughter, who married Mr. John Stuart, of Bombay, left several children, one of whom, George Ballingall Stuart, was Surgeon to the Scots Greys, and afterwards to the 3rd Battalion Grenadier Guards.

Travel.

THE BRITISH EAST AFRICA PROTECTORATE.

By Quartermaster-Sergeant R. STANLEY.
Royal Army Medical Corps.

As this is a part of the British Empire about which little is known by the non-commissioned ranks of the Corps, or, indeed, for that matter, by the British public in general, a few brief observations and impressions obtained after a short residence in the now regarded capital of the Protectorate, may prove interesting to many, and valuable to any Non-commissioned Officer of the Corps who may in future be sent to serve here.

The passage from England is provided by the Crown Agents for the Colonies, and generally by the German East Africa line, from Dover to Mombasa. Various interesting ports are called at on the voyage out and sufficient time is allowed for passengers to go ashore and see the principal sights, in addition to permitting needed purchases and exercise. The passage occupies about thirty-one days, and leaves little to complain about excepting the food, in the catering of which regard for the British palate receives but a moderate amount of consideration.

Having arrived at Mombasa a boat is hired for the conveyance of passenger and baggage from ship to shore, the passenger landing at a jetty, while the boat pushes nearly ashore a little farther off, and "boys" wade knee-deep and "head" the baggage for conveyance to Custom House for the usual examination. An import duty of 10 per cent. is imposed on any article imported outside actual personal baggage. Should the vessel arrive in time on a day on which the train leaves for up-country, it is as well for the passenger to continue his journey to the railway station and superintend the safe storage of baggage and booking of passage. The director of transport at Mombasa furnishes the necessary warrant for railway journey on application. If unable to proceed to destination on day of disembarkation, good hotel accommodation is available at inclusive rates—5 to 8 rupees per diem—at either the Grand or Cecil Hotels.

On arrival at Mombasa one is struck with the verdure and richness of country, as evidenced by numerous plantations of cocoanut, orange, mango, banana and other tropical fruit trees. The coast

line enjoys heavy rainfalls from April to July and from October to November, and in consequence the fertile soil produces abundantly. These physical features are maintained for some 30 or 40 miles of the railway journey inland, where large tracts of thorny bush and scrub are passed through. The next morning finds one travelling through large open plains which are covered with excellent pasturage swarming with game, numerous varieties of gazelle, antelope, zebra, giraffe, rhino., ostriches, lions, leopards, hyæna, &c., &c., which provide unrivalled opportunities for sport. Passengers are provided with meals at certain railway stations, and the journey from the coast to Nairobi occupies twenty-four hours.

The altitude from the coast is gradual, varying to 8,000 feet. The higher table lands are eminently adapted and suitable for white colonisation, possessing, as they do, great natural fertility and a climate to be compared with that of Southern Europe. Such is the country round about, and to the north and west of Nairobi, where settlers are rapidly taking up land. Two crops of cereals and potatoes can be raised annually, whilst the grazing land will support herds of cattle and sheep. There is certainly a natural wealth in the soil which, when developed, will not easily be surpassed by any other country.

Nairobi is the headquarters of the Uganda Railway, which has large works for the manufacture and repair of rolling stock. The town, which is practically of mushroom growth, is 327 miles from the coast and is built on a plain, which, during rainy seasons, is a swamp. Several hotels are in existence, and living may be said to be fairly cheap, vegetables, meat, fowls and eggs being less expensive than in England, whilst the cost of groceries is somewhat greater. Excepting the Treasury, Customs and Postal Departments, the other Government departments have their headquarters here, and it is the centre for the numerous settlers in the district, whose produce is either disposed of locally or despatched by rail to other places. The 1st and 3rd Battalions of the King's African Rifles also have their headquarters at Nairobi, and the Nairobi Hill contains the residences of most officials and the more wealthy townspeople. The Norfolk Hotel is the leading hotel here, and for permanent boarders the tariff is 180 rupees per month, and 10 rupees a day for casual boarders. The tariff of the other hotels averages about 100 rupees a month for permanent boarders, and 5 rupees a day for non-permanent.

The climate is apt to be misunderstood by new comers, as, owing to altitude, there are generally variable cooling breezes

throughout the day, which, nevertheless, do not lessen the effects of the sun's vertical rays, and the incautious person who fails to provide himself, or herself, with a large, strong, sun-resisting head-dress, will inevitably suffer in consequence. The maximum shade temperature at Nairobi for 1904, was 84·0° F., and the minimum was 44·0° F., whilst the total rainfall was 25·62 inches. Ordinary summer mufti, as worn at home, is suitable for every-day wear, and a light overcoat is sometimes needed in the evenings and early mornings. One or more blankets are necessary, as the nights are sometimes cold. The days and nights are of equal duration, the latitude being only $1\frac{1}{2}°$ south.

Sporting pastimes include shooting, hunting, polo, tennis, hockey, football and cricket, and two race meetings are held annually. Roads are fairly good for cycling. The Nairobi Club is established for the higher officials and wealthy residents, but the Railway Institute, which contains a large reading-room with library and an attached refreshment bar and billiard-room, is available for the person of moderate means, on payment of a monthly subscription of 4 rupees. The reading-room of the institute is sometimes used for dances and concerts.

The climate of the higher table lands of East Africa may be regarded as healthy, and in some places invigorating. The children of white parents thrive well, and they bear evidence of this in their healthy, ruddy complexions. Colds and chills can be avoided by the exercise of ordinary precautions, and there appears to be an absence amongst white people of the many forms of disease, infectious and otherwise, so common at home with the infantile and adult population. Bubonic plague is regarded as endemic in East Africa, but the disease, so far, has been confined to the African natives and Indians. Malarial fevers do not prevail in the higher table lands.

In conclusion, I hope the day is not far distant when many of the subordinate appointments of the Medical Department may be given to Non-commissioned Officers of the Royal Army Medical Corps (as on the West Coast and Nigeria), whose training and experience so admirably fit them for such positions.

Reprint.

THE TIBET MISSION FORCE, 1903-1904.

(1) MEDICAL REPORT.
(2) SANITARY REPORT (LINES OF COMMUNICATION).
(3) EXTRACTS FROM GENERAL MACDONALD'S REPORT.

MEDICAL REPORT ON THE TIBET MISSION FORCE, 1903-1904.

(a) *Medical Personnel.*

The Medical Strength was thirty medical officers, of whom four were of the Royal Army Medical Corps and twenty-six of the Indian Medical Service, with eight Assistant-Surgeons and sixty-seven Hospital Assistants.

The Field Hospitals numbered two sections of British and ten of native, namely, Nos. $\frac{D}{21}$ and $\frac{A}{2}$ British, and $\frac{B}{42}$, $\frac{C}{56}$, $\frac{D}{57}$, $\frac{A, B, C \& D}{71}$ and $\frac{B, C \& D}{76}$ Native.

Two Native General Hospitals were established, one of 200 beds at Gangtok for the feverish season and afterwards at Siliguri, and the other of 100 beds at Alipur. For British troops the station hospital at Lebong (Darjeeling) was used as a British Base Hospital.

No medical store depôt was required, as Calcutta was so near to Siliguri by rail, and the Native General Hospital at Gangtok kept a stock of medicines.

(b) *Physical Geography and Medical Topography of the Country.*

The Force marched from the Indian plains at the railway terminus of Siliguri (310 feet only above the sea-level), up across the Sikkim and Chumbi Himalayas to the centre of Tibet. The track at first led through the submontane sâl forest to the gorge of the Teesta River, and up that malarial gorge through slate and shale formation for about fifty miles to Upper Sikkim. Thence it zigzagged steeply up through gneiss and granite into temperate and alpine forest and out on to the bare rocky uplands above Gnatong and Changu, where the track crossed a high southern spur of the Himalayas by the Jelep or Nathu passes, 14,390 feet and 14,300 feet respectively, above the sea-level, and descended over 4,000 feet into the valley of Chumbi, in the outer Himalayas, to the east of Sikkim and bordering Bhutan. From Chumbi (9,700 feet) the track ascended the pine-clad valley of the Mo River to the bare shingly plain of Phari (14,500 feet) swept by icy dust-storms, thence it crossed the main axis of the Himalayas by the Tang pass (15,200 feet) on the flanks of Mount Chumolhari to the great plateau at Tuna (14,900 feet) where, and in the Upper Chumbi Valley, the greater part of the force spent the winter.

In the early spring, at the end of March, the Force continued its advance to Gyantse, passing down Tuna-Guru plain, past the lakes of Rham and Kala and through the Zamdang defiles to the broad flat-

bottomed cultivated valley of Gyantse, an offshoot of the Tsangpo valley of Western Tibet, at an elevation of 13,200 feet.

The advance to Lhasa, after the storming of the Gyantse Jong on July 6th, led up the north-eastern branch of the valley, up the Neru River to Gabshi, thence through a series of defiles to the glacier-lined Karo pass (16,500 feet) beyond which the track descended into the basin of the great land-locked Yamdok Lake (about 15,000 feet). Proceeding along the shore of this lake for about twenty miles, the track climbed over the mountain ridge, separating the lake basin from the Tsangpo valley, by the Khamba and Dok passes (16,500 and 16,700 feet respectively), and descended to the Tsangpo River at the iron-bridge ferry or Chaksam (12,100 feet), where on both sides of the river were luxuriant fields with several large walnut and other trees. On crossing the Tsangpo, the path led up the bank of its tributary, the Kyi River, for forty miles to Lhasa, through several bold defiles of limestone rock, banded by granite.

Lhasa itself is situated on the right bank of the Kyi River on a marshy, partially cultivated plain encircled by bare rocky hills rising to a height of 3,000 feet or more above the plain, which here was about 12,300 feet above sea-level. The troops were encamped on a gravelly part of the plain about a mile to the north of the city.

(c) *Its Vegetable and Animal Products.*

The chief vegetable products in Western and Central Tibet are barley, wheat, oats, peas, mustard, potatoes, turnips, radishes, cabbage, onions and other vegetables, and a few walnuts and peaches. Aconite (*A. ferox*) also occurs wild throughout the valleys. The chief animal products are wool, yak-tail, fly-whisks, furs, sheep and sturdy ponies and mules. The wild asses which roam over the plains are not utilised.

In the Chumbi Valley the hardy cereals, wheat, barley, and peas, are cultivated only for local requirements. Wild madder is exported in bales. A few herds of the great stag or Shao inhabit the upper forests of this valley.

(d) *Climatic Peculiarities.*

The climates to which the Force was exposed were unprecedented in their rigour and range. They extended from the tropical climate of the Terai and Lower Teesta gorge to the arctic cold of the great passes and the inclement Tibetan winter, combined with the trying effects of the rarefied air of these immense altitudes on the respiration and heart. The cold frequently was positively painful, especially when the wind blew. The lowest temperature recorded during the winter was on the Tang pass on the night of January 7th, when the thermometer registered minus 26° F., or 58° F. below the freezing point. In December and the early part of January, until the bitter dust-storms set fully in, the Lower Chumbi Valley had fairly bright and cloudless skies during the day, although during the nights the temperature fell to 20° of frost. The garrisons at Phari aud Tuna, and the convoys which daily crossed the passes, led a miserable existence all winter tormented by the cold and icy wind and altitude. At the end of January chill fogs swept up the valleys, resolving themselves into drizzling sleet in the lower valleys, and clogging snow and blizzards in the upper valleys and passes. With

March milder weather set in with frequent slight falls of snow and a marked rise of temperature in the sunshine. At Gyantse snow fell during every month of summer. The rainfall was very considerable. At Gyantse and Lhasa about thirty inches must have fallen during the summer and autumn. Partial statistics for Chumbi and Gyantse are given in Appendix I. The lower line of communication in the Teesta gorge was closed during the most malarial season of the year, in midsummer and autumn, and the traffic sent by way of the Ghoom Station of Darjeeling and Kalimpong.

(e) *Principal Diseases with their Causes.*

The general health of the troops has been very good, despite the great vicissitudes of climate to which the men have been exposed, and the great altitudes at which the operations have been carried on. The greater portion of the sickness and deaths was attributable to the climate. The total number of deaths and men invalided up to September 30th, 1904, excluding war casualties, were 411 and 671, respectively, and of these 202 and 405 were due to the climatic conditions :—

	British Troops	Native Troops	Followers	Totals
Total deaths excluding war casualties ..	4	102	305	411
Deaths due to climate	4	60	138	202
Invaliding, exclusive of war casualties ..	44	192	435	671
Invaliding due to climate	29	149	227	405

There was only one case of scurvy, notwithstanding the frequent absence of fresh vegetables; the large ration of fresh meat doubtless contributed to this happy result.

Amongst *British troops* the principal diseases were diarrhœa, bronchitis, rheumatism, remittent and enteric fevers. The causation of these were, respectively, indigestible or insufficiently-cooked food, cold and chill, malaria and heat of sun. The source of the enteric infection was not traceable. Except a few non-commissioned officers and men of departments the British troops were not exposed to the rigours of the Tibetan winter, having come up from India in May.

Native troops suffered most severely from intermittent fever. After this came bronchitis and pneumonia, then dysentery, diarrhœa, rheumatism and frost-bite. Dilatation of the heart was not infrequent. Venereal disease was uncommon in Tibet proper, but fairly prevalent in Sikkim and in the lower Chumbi Valley. A mild epidemic of mumps occurred in the summer, and some cholera in the lower Teesta Valley. Snow-blindness, owing to the general use of goggles, was very rare and mild, until the return march when snowbound at Phari in October, when about 200 cases occurred. The cause of the intermittent fever was doubtless brought from India, as the disease occurred chiefly about 2,000 feet, after a chill, though in many cases it may have been contracted in passing through the malarial Terai and lower gorges, despite the prophylactic issue of quinine. Further particulars regarding this continued and intermittent fever, as

well as the cholera and enteric epidemics, are detailed in the Sanitary Report.

Diarrhœa and dysentery were largely due to the difficulty of cooking food, owing to the lowering of the boiling point by the lessened atmospheric pressure of the high altitude, the scarcity of fuel and the rapid radiation in the excessive cold. Pneumonia and bronchitis were due chiefly to exposure to the cold and high altitudes. They were especially common at Phari in the winter months, where the barracks were badly ventilated and filthy, and the acrid smoke of the argol fires irritated the respiratory passages. At Tuna pneumonia was mostly confined to those sentries who were exposed to the excessive night cold. Frost-bite scarcely occurred until the first heavy fall of snow, although the actual cold then was less than previously; and most of the cases were complicated, if not in part caused, by burns, through placing the frozen limbs too close to a fire. The mumps epidemic commenced amongst the Nepalese coolies and spread thence to the Gurkhas mainly.

Followers suffered chiefly from intermittent fever, diarrhœa and dysentery, bronchitis and pneumonia, from the same causes as native troops. They also had a good deal of debility, apparently from impoverished blood and continued work at high altitudes.

An attempt was made to ascertain whether the increased frequency of breathing in these high altitudes produced any expansion of the chest. Men of the 40th Pathans and 19th Punjabis from the Punjab plains had their chests measured before entering the hills and again after a residence of five months in high altitudes. The result showed a slight increase in chest capacity. Some observations were also made on the effect of altitude on the corpuscles and hæmoglobin of the blood.

(*f*) *Wounds—Description and General Treatment Adopted.*

There were 161 killed and wounded in action :—

	British Troops	Native Troops	Followers	Totals
Killed in action	4	21	5	30
Died of wounds received in action ..	..	16	2	18
Non-fatal wounds ,, ,, ..	20	91	2	113
Other war casualties, explosions, drowning, &c.	11	22	..	33
Of latter, died	4	10	..	14

The variety of the wounds met with calls for remark, as the Tibetans were armed with weapons from the most primitive to the most modern.

Sword-cuts were numerous and all healed well, in some cases with wonderful rapidity. Contusions from stones were not uncommon, mostly severe lacerated contusions of the scalp. The wounds caused by the Lhasa-made Martini pattern rifles with their large bore (about ·550) were invariably severe, and often shattered bones extensively, the bullet emerging by a very large exit wound. In fact, the result was akin to that of an explosive bullet. Wounds caused by the smaller smooth-bore matchlocks generally became very septic, especially when the bullets lodged, as they were generally wrapped in dirty cloth or tow to make

them fit the bore of the musket. Again, the wounds caused by the balls of the large "jingals" in Gyantse Jong, varying from 4 ozs. to nearly 4 lbs. in weight, caused terrible wounds, which were generally rapidly fatal from shock. As was to be expected, such wounds as were due to modern small bore high velocity rifles healed quickly and without trouble. The general treatment adopted was the application of a "First Field Dressing," which was not removed for several days if no discharge showed through, and no excessive pain or fever occurred. In this connection it is to be noted that the application of the waterproof jaconet of the new first field dressings over the pad of gauze, as directed, seems a mistake, as it tends to keep the wound moist and so acts as a poultice; whereas the drier simple wounds are kept the more rapidly they heal. Suppurating and complicated wounds were treated on the usual antiseptic principles.

The wounded Tibetans were treated by our surgeons in tents or huts near our posts.

An application for an X-ray apparatus was not complied with, with the result that three cases had to be sent back to India with their bullets unremoved.

(For subjects (*g*) to (*n*) see separate Sanitary Report by Sanitary Officer Major Aldridge, R.A.M.C.).

(*o*) *General Working of the Medical Service in the Field.*

At the railway base at Siliguri, a section of a field hospital was established as a base hospital, which when the force became increased, was replaced by a general hospital. The latter was located at Gangtok (5,000 feet) for the rains, and afterwards moved to Siliguri, whilst a second native general hospital at Alipur received the invalids at the railway terminus in Calcutta, and despatched them to their stations in India.

As the force advanced a section of a field hospital was established at each chief post along the long line of communications; and at each of the smaller intervening posts a hospital assistant with a pair of panniers and hospital comforts was left. Needless additional difficulty and delay were experienced in establishing these sections, owing to the first field hospital having been issued as an indivisible unit without the extra establishment and tentage necessary for forming independent sections.

At these posts along the communications, hospital huts were built on a standard plan for the protection of the local sick and sick convoys against the cold and snow of the upper tracts and the rain of the lower valleys.

The unusual difficulties of transport over such lofty hill-tracks compelled a reduction in the weight of the equipment of the field hospitals. This was reduced by one-fourth its weight (as detailed in the departmental report) by eliminating non-essential articles, with a gain in efficiency, it can be said, after this reduced scale has stood the test of a year's constant strain.

The unprecedented physical difficulties of transport over the steep mountain tracks and in such high altitudes, necessitated several modifications in the ambulance for the transport of the sick. As the Indian *kahars* were manifestly unsuited for this work, and had proved on the

Khamba Jong line almost incapable of carrying a loaded *dooly* above 8,000 feet amongst the hills, they were replaced by several hundred hardy Tibetan and Sikkimese *dandywalas* from Darjeeling, temporarily enlisted for this purpose. These were quite undisciplined, and had to be trained to their duties. The Sikkimese proved a failure, nearly all of them deserting after the first few days. The Tibetans, on the other hand, were an undoubted success on the whole; for, although about 70 per cent. of them deserted within the first few months through fear of our defeat by their kinsmen, those who remained and a batch of Garhwalis recruited at Naini Tal, did practically all the carrying of sick and wounded in the fighting force at the front. I have accordingly suggested in the departmental report that a few of these Tibetan and Garhwali *dandywalas* should be permanently enlisted in the Army Bearer Corps for service in Jalapahar and Lebong, and in the Naini Tal, Chakrata and Lansdowne station or regimental hospitals, where they could be properly trained, and form a nucleus for a larger cadre for employment in hill warfare.

The form of the regulation *dooly* and stretcher proved most unsuitable for work in these hilly regions. The ordinary regulation *dooly* was so heavy and cumbersome that it could not be carried even in an empty state up many of the steep tracks, but had to be unshipped and carried up in pieces; and at sharp turns and zigzags it was positively dangerous to its occupant and bearers. It was thus practically useless for continuous transport in the hills and too heavy for transport on the high plateaus. Two Amesbury *doolies* were tried experimentally, and proved to be a vast improvement over the ordinary *dooly*, in lightness, manageability and handiness, and comfort for the patient. A few suggestions for the further improvement of the Amesbury are detailed in the departmental report.

Blanket stretchers were also found to be quite useless for steep hill transport, and dangerous to the patient, as no manner of tying him in could prevent his slipping out.

For the steeper passes several ambulance chairs were constructed by Lieutenant-Colonel Waddell, I.M.S., to be carried on men's backs on the framework, on which the Tibetans are accustomed to carry their own loads, and they proved of service.

Latterly the hammock devised by Major A. R. Aldridge, R.A.M.C., was used with much success. It weighs, with its two poles and canvas cover, about 24 lbs.; with one pole only, 15 lbs. It is peculiarly well suited for narrow zigzag hill paths, and holds the man securely against falling out even on the worst ground. During the present campaign four of these hammocks have been regularly used for nearly four months with the sick convoys proceeding every eight or ten days between Chumbi and Gangtok, a distance of forty miles, including the Nathu and minor passes, and have latterly been the only means of transferring helpless patients over this difficult part of the line of communications. This Aldridge hammock should certainly replace the blanket stretcher used by regiments for hill warfare.

Hathaway's crutch-support for riding saddles was tried extensively and found useful; its obvious defects and their remedy are detailed in the special departmental report.

Ekkas were used as sick transport on the Phari-Kangma Plain, to eke out other ambulance; and on the Teesta cart road from Rangpo to

Siliguri ran ambulance bullock *tongas*. The great length of the communications, extending for over 300 miles from the base across such difficult country, with numerous posts, absorbed such a large number of the field hospitals, that not more than one section per battalion, and usually less, was available for the fighting forces, and this proved sufficient.

On the advance to Lhasa two sections of field hospitals were fixed at Gyantse as an advance base, and their ambulance utilised for convoys of sick along the Lhasa road.

The Principal Medical Officer was able to inspect all the posts along the line of communications at least once, and most of them several times; but when the Lhasa column advanced, and was for a time practically cut off from immediate communications with the lower line, a senior medical officer (Major Aldridge, R.A.M.C.), was appointed for the lines of communications.

Altogether the medical service in the field worked very well under an exceptionally severe and prolonged strain, which was trying to all.

L. A. WADDELL, *Lieutenant-Colonel, I.M.S.*,
Principal Medical Officer Tibet Mission Force.

MEDICAL AND SANITARY REPORTS (LINES OF COMMUNICATION).

(*g*) *Principal Diseases.*

Cholera was known to exist in various villages in the Teesta Valley in May, and on June 2nd an outbreak began among local persons employed by the Supply and Transport Corps between Siliguri and Riang. In all, forty-four cases were reported, thirty-nine of which were at Sivoke, the majority being grass-cutting coolies, and the remainder local cart-drivers.

Investigations on the spot pointed to the infection having been acquired at a spot about four miles on the Siliguri side of Sivoke. No cases occurred among the troops or Government followers living in the camps.

During the remainder of June isolated cases occurred at or near all the posts as far as Gangtok, thirty-three in all, but, with the exception of two bullock-drivers, none of the cases were in persons living in the military camps, but in road and grass-cutting coolies.

On July 4th and 5th eight cases occurred in the camp at fifth mile beyond Gangtok. All these were Sikkim coolies who arrived on the 3rd and had, therefore, acquired the infection on the way up.

During the latter part of June four cases occurred at Gangtok, and on June 30th an outbreak commenced, practically confined to Government coolies recently arrived and encamped there; there were twenty-two cases in all, the last on June 25th.

These coolies were encamped below the bazaar, and, it is believed, took their water from some springs in the hill below the bazaar, where some of the imported cases had occurred. The pipe water-supply of Gangtok was above suspicion, but did not reach the camp.

During July, August, and up to September 2nd, when the last case was reported, twenty-one more isolated cases occurred at various posts from Siliguri to Changu.

In all 128 cases were reported, including one sepoy, two enlisted followers, and thirty-one other Government followers; the remainder being persons belonging to the country, and not living in the military camps.

Although cases were treated at fifteen posts from Siliguri to Changu, yet, with the exception of the outbreak among the Sikkim Coolie Corps at Gangtok, in no case did the infection spread in any camp.

The means adopted to prevent the spread consisted of the provision of protected water-supplies for all posts; isolation of cases, and the provision of special tents or huts for this purpose: disinfection or destruction by fire of clothing and utensils used by the sick, and of huts. In two cases traffic was temporarily diverted from the routes infected. In the case of troops marching over the infected route drinking water was boiled. In the case of the infected Coolie Corps the men were temporarily isolated.

Enteric fever was not prevalent on the lines of communication; this was probably owing to the very small number of British troops. Three cases occurred in British soldiers, and one in a sepoy. In three of these the diagnosis was confirmed by the agglutination test. Two cases in Tibetans also came to my notice; in one, fatal in the second week, the lesions in the intestines were typical of the disease, and in the other the disease ran a typical course with hæmorrhage from the bowel, and the blood serum agglutinated a dead culture of *B. typhosus* in a dilution of 1 in 40 in thirty minutes.

A very considerable number of cases of continued fever of a severe type and somewhat high mortality occurred at various posts from Phari to Gyantse, that is at altitudes of 13,000 to 15,000 feet. Though returned as "remittent fever" they had not the characteristics of malarial fever, and in the few in which I had the opportunity of examining the blood malarial parasites were not found.

Malarial fevers were prevalent in the Teesta Valley and among the Indian coolies employed on the Mathu-La Road. Of 300 cases in which the blood was examined by Captain Turnbull, I.M.S., malarial parasites were found in 57: benign tertian 28, quartan 3, and malignant tertian 26.

Most of these cases occurred at or near Changu at an elevation of about 12,800 feet, and no mosquitoes were found there; the remainder at Rangpo, where only *Stegomyia fasciata* and *A. Listoni* were found. It is therefore probable that the infection was acquired either in India or while the men were coming through the Teesta Valley. Mosquitoes were, however, occasionally to be found at elevations up to 15,000 feet (Tuna), but none of those which I caught belonged to any of the species known to convey malaria. No evidence was obtained that fresh malarial infections occurred in Tibet proper.

Dysentery and diarrhœa on all parts of the line, and pneumonia at the higher altitudes, have accounted for a large proportion of the sickness and deaths, and have existed at all times of the year, but neither has appeared in epidemic form.

Cardiac diseases have accounted for an unusual proportion of deaths, no doubt owing to the effects of severe work at high altitudes on hearts already diseased. A number of men have also been invalided for disordered action of the heart with physical signs of dilatation: these, for the most part, seem to recover with rest at lower altitudes.

Other diseases.—Two cases of relapsing fever occurred at Rangpo in Kashmir coolies who had arrived about sixteen days previously. The spirillum was found in their blood by Captain Turnbull, I.M.S. The disease did not spread.

Small outbreaks of mumps occurred at several posts.

Fifty-two coolies at Rangpo suffered from symptoms of poisoning from eating the seed (nut) of the *Jatropha curcas*. The symptoms were those of severe gastro-intestinal irritation with hæmorrhagic stools in some cases, and collapse. None of the cases were fatal.

A fatal case of poisoning occurred at Lingmathang in a mule-driver from eating some berries; but as he had eaten several different kinds, the one or ones causing the fatal symptoms could not be identified. The symptoms were diarrhœa, vomiting and collapse. Death followed in about two hours after the onset of the symptoms.

(*h*) *Water Supplies.*

Of the thirty-one standing camps from Siliguri to Gyantse which were occupied, the water-supplies of all except Siliguri, Gangtok, and Tuna, were derived from rivers or streams.

At Siliguri wells were used. These were unprotected, and the following recommendations were made and carried out: the wells covered, pumps provided at the side, and the water pumped to tanks outside a fence thirty yards in diameter, round the well. A separate place to be provided for washing.

At Tuna, one unprotected well existed close to the collection of Tibetan houses around which the post was established, and in ground obviously extensively fouled; water was drawn in any available vessel. This was recommended to be closed, and water obtained from a marked spot in the stream close by.

At Gangtok there is a good piped supply from springs well situated. As this did not reach the camps of the Ekka Corps, a subsidiary piped supply from a well-situated spring was provided. Some springs also exist below the bazaar, obviously liable to dangerous pollution; they should not have been used and were condemned, but it is believed that some coolies, temporarily occupying a camp adjacent to them, used this water at a time when cases of cholera were occurring in and near the bazaar; a small outbreak of cholera occurring among these coolies.

Of the supplies derived from rivers, the Teesta, Amo-chu, and Nyang-chu, though somewhat turbid during heavy rain, and to some extent liable to pollution from camps and villages higher up, yet the volume and rapid current of the rivers were in most cases sufficient to reduce the risk of conveyance of disease by this means to a minimum.

At Gyantse, however, the river water during the rains is extremely turbid from silicious matter, which takes long to subside; besides which there are a considerable number of villages on the banks. Alum had little effect in clearing this water, and sedimentation tanks dug at the side of the river failed to retain the water. A well was dug, twenty feet deep, close to the river, but no water found. Norton tube wells for use of the winter garrison are being sent up, and though a suction pump at this altitude will not raise water more than some eighteen or twenty feet, yet, by sinking the pump in a dry well, it is anticipated that a satisfactory supply will be obtained.

An analysis of this river water, taken on September 7th, gave the following results:—

	Parts per 100·00
Total solids	62
Chlorine	·5
Nitrites	Present
Nitrates	Considerable
Total hardness	16
Ox. required at 80° F. in 15 mins.	·15

The camps supplied from small streams were mostly in the Teesta Valley and Sikkim. These supplies were selected as being free from contamination from villages above; but there was great risk of pollution by followers in the camps themselves, as it was found impossible to enforce their taking water only from the allotted spots. To obviate this, in ten cases the water was piped from some distance above the camp, in one case a distance of a mile, in bamboo pipes raised well off the ground. These answered admirably, provided the source was watched to prevent grass-cutters and other local people employed in the camp locating themselves above the intake. In two cases this occurred, and they were removed and their huts burned.

The supply for Chumbi was similarly piped in a wooden channel from a stream. Analysis of the water gave the following results:—

	Parts per 100·00
Chlorine	1·5
Nitrites	None
Nitrates	None
Total hardness	3·5
Ox. required in 15 mins. at 80° F.	·8
Ammonia, free	Considerable

Number of micro-organisms growing on agar in four days at 37° C., 494 per cc.

The large amount of organic matter was accounted for by decaying vegetable matter in the stream. After removing this the ox. required was reduced to ·4.

(*i*) *Rations.*

The rations issued to native troops and followers were not always of good quality. Of a consignment of sixty tins (30 lbs. in each) of atta, all of the nine which I examined were quite unfit for food, containing large numbers of maggots and weevils. In a considerable number of other cases atta, rice, and ghee were found to be decomposed or attacked by moulds or insects.

A more rigid inspection by a competent officer of these rations before despatch would have avoided both the waste of transport and in some cases the issue of food which was unfit for consumption.

The locally procured Bhutia rice was of very poor quality, containing much husk and earth; and likely to predispose those eating it to bowel complaints, which were very prevalent. "Sampa"—parched barley ground into flour—obtained locally, was issued to some extent instead of atta or rice; it was not liked by the men, chiefly on account of the difficulty of making chupatties from it, owing to the small proportion of gluten. When taken in the form of porridge it seems a nutritious food. The low boiling[1] point of water at the high altitudes reached, necessitates

[1] Brought to notice of the Director-General, Contracts and Registration, by the Principal Medical Officer, His Majesty's Forces in India.

prolonged boiling of food to render it fit for eating. In the case of cereals, and particularly of dhall and peas, the temperatures (about 87° C. at 15,000 feet) are scarcely sufficient to soften the envelopes of the starch grains. The allowance of wood was not sufficient for this, and when not locally procurable by the troops an increase of the allowance would have been very desirable.

Potato chips require such prolonged soaking that they are of little use on the march. The following were the scales of rations issued :—

Rations for British Troops.

Bread	1¼ lbs. daily
Fresh meat (inclusive of bone)	1¼ lbs. ,,
Fresh vegetables— Potatoes, 12 oz. Mixed vegetables, 4 oz.	1 lb. daily.
Rice	2 oz., 3 times a week
Tea	1 oz. daily
Sugar	2½ oz. ,,
Salt	½ oz. ,,
Fuel	3 lbs. ,,
Pepper	⅛ oz. ,,
Jam	1 tin ,,

In lieu of 1 lb. of fresh vegetables the following can be issued :—

Potato chips	3 oz. daily
Pickles	1 oz. ,,
Pickle vinegar	½ oz. ,,

Rations for Native Troops and followers.

Atta or rice	1½ lbs. daily
Dhall	4 oz. ,,
Ghi	2 oz. ,,
Goor	1 oz. ,,
Salt	½ oz. ,,
Tea	¼ oz. ,,
Chillies	⅙ oz. ,,
Turmeric	⅙ oz. ,,
Garlic	⅙ oz. ,,
Ginger	⅙ oz. ,,
Fuel (to extent locally procurable)	1½ lbs. ,,
Meat (mutton or goat inclusive of bone)	28 oz. weekly

Atta-eating men will have the option of drawing ½ lb. rice instead of a similar quantity of atta, and *vice versâ*.

Rations for Darjeeling Coolie Corps.

Rice	2 lbs. daily
Dhall	8 oz. ,,
Ghi	2 oz. ,,
Salt	1 oz. ,,

Rations for Tibetan Dandy Bearers.

Rice	1½ lbs. daily
Meat	1 lb. ,,
or	
Dhall (in lieu of meat)	8 oz. ,,
Ghi	2 oz. ,,
Salt	1½ oz. ,,

(*j*) *Spirits and Malt Liquors.*

An issue of rum, 1 oz., or tea, ½ oz., and goor 1 oz. in lieu, was made occasionally during particularly inclement weather to units employed on road-making or other hard work.

(*k*) *Medical Comforts for the Sick.*

These were, with one exception, of good quality; but of one particular brand of condensed milk between 70 and 80 per cent. were bad.

(*l*) *Clothing.*

The scales of clothing issued were liberal and well devised, and in spite of the fact that a considerable number of cases of frost-bite occurred, it is difficult to see how they could have been much improved on.

It is, perhaps, questionable whether the benefits obtained from the Gilgit boots were sufficient to compensate for the extra bulk and weight to be carried. They are useless in wet weather, and many of the men never wore them at all.

More frequent renewals of socks would have been of advantage, as they became worn out very quickly.

Some of the waterproof sheets were of poor quality, and after short use allowed moisture to pass through them.

Khaki serge would have been more suitable to the climate than drill.

The following were the scales:—

Ordinary Scale for British and Native Troops and followers.

Blankets, barrack	2
Coat, warm	1
Mittens	1 pair
Balaclava cap	1
Waterproof sheet	1

Special Scale for British and Native Troops and followers for Winter Months only.

Poshteen	1
Razai	1
Woollen gloves	1 pair
Fur-lined gloves	1 ,,
Lamb's wool vest	1
Overalls	1 pair
Comforter	1
Gilgit boots	1 pair
Goggles	1 ,,

N.B.—One extra blanket and one pair of woollen drawers were also issued.

Nepalese and Tibetan Scale.

Coat, warm, followers'	1
Jersey	1
Pyjamas	1 pair
Blankets, country	2
Waterproof sheet	1
Balaclava cap	1
Boots, followers'	1 pair

(*m*) *Sanitary Condition of Camps, Latrines, and Transport Lines.*

The maintenance of satisfactory sanitary conditions in standing camps, occupied for several months by small bodies of troops, sufficient only for guards and escort, and large numbers of transport drivers and followers employed daily with transport duties, must necessarily be a matter of some difficulty.

The difficulties in the present case have been considerably increased, in many of the camps, by the heavy rainfall.

A system of pail latrines was used by the hospitals, the contents of

the pails being buried at a distance from camp; or, if from infective cases, burnt.

Trench latrines were used by troops and followers, but scarcity of labour for a time at certain camps, led to the digging of trenches being neglected, and a very foul condition of the land round the camps resulted.

The proper disposal of litter, either by burial or burning, does not seem to be accepted by transport units as part of their duties.

If done regularly the amount of labour involved is not great, but when large accumulations have been allowed to collect, as happened at several camps, its disposal in rainy weather is not easy.

In certain camps this was undoubtedly largely responsible for the enormous numbers of flies which accumulated, and which are a recognised means of spreading certain diseases particularly prevalent in camps.

(n) *Conservancy Establishments.*

The conservancy establishments of regiments and of field and general hospitals were sufficient, but the various transport units, mule, bullock, and coolie corps, were not provided with any conservancy establishments.

A certain number of sweepers were provided for general duties at the standing camps, including the small hospitals under hospital assistants which were improvised at posts where there were no field hospitals. At several camps these were not sufficient for the purpose, and in some cases the local supply and transport store-keepers seemed to be under the impression that these men were intended only for duty in their stores. As it required some weeks for sweepers obtained from India to reach the further posts, the sanitary condition of the camps suffered in consequence. I think a sufficient establishment of sweepers should be attached to all transport units.

Chumbi, Tibet,
October 19th, 1904.

A. R. Aldridge, *Major, R.A.M.C.,*
Special Sanitary Officer and S.M.O.,
Lines of Communication, Tibet Mission Force.

Extracts from a Report, No. 1584-A., dated Camp Fort William, November 30th, 1904, from Brigadier-General J. R. L. Macdonald, C.B., R.E., Commanding Tibet Mission Escort, to the Adjutant-General in India.

Composition of Force.

Infantry.—The Infantry with the Force was: Half a battalion, Royal Fusiliers; 19th Punjabis; 23rd and 32nd Pioneeers; 40th Pathans; 8th Gurkhas.

Of the above, the 23rd and 32nd Pioneers and 8th Gurkhas have served throughout the campaign during the trying winter operations of 1903-1904. The wing, Royal Fusiliers and 40th Pathans, joined the Force in June, 1904, and the 19th Punjabis a month later. The Infantry taking part in the winter operations of 1903-1904 had excessively trying times, calling for great fortitude and endurance, long marches at great altitude with most trying climatic conditions. The Pioneers had also roads to construct in frozen soil and under great difficulties, whilst throughout the strictest military precautions had to be taken. Under all these hardships the men played up splendidly, and performed their

onerous duties in the most soldier-like manner, whilst excellent discipline was maintained.

Mounted Infantry.—There were three companies, each 100 strong, employed with the Force. The 1st Company, composed of men from 23rd and 32nd Pioneers and 8th Gurkhas, was raised locally, and the remaining two companies were raised in India, and were composed of Pathans and Punjabis; the 3rd Company only arriving half-way through the operations.

Engineers.—Two companies of Sappers and Miners.

General Notes.

British Infantry.—The metal *pakhals* were found to wear out and leak badly where the hose pipe joins the zinc body, and a better attachment seems desirable.[1]

Cooking pots are very heavy, and require one mule per company to carry them.

Aluminium cooking pots are recommended, when the cooking pots of two companies could be carried by one mule.

Softer material should be used for the men's braces and straps.

The provision of a percentage of cutting tools is much required. Twenty-five *kukris* per company would be most useful in camp and could be carried by the men.

A small number of waterproof capes, say twenty per battalion, should form part of the Field Service Equipment, and are very necessary for guard duties in rainy countries.

Each man carried one day's rations on his person, and his great-coat, *poshteen*, or "British warm coat" on his back. The obligatory mules for great-coats were thus available for other purposes.

The number of *pakhals* taken was reduced to one per company.

A large saving in tentage was effected by using 45lb. bell-tents with ten fighting men or twelve followers in each tent; the tents proved satisfactory.

Baggage was of course increased by need of special warm clothing.

The allowance of mules for coffee-shops was increased to one per company, as the supply could not depend on providing extras.

A certain number of mules was allowed for officers' mess, and no private transport allowed.

Native Troops.—Twenty waterproof capes per battalion should be issued as part of Field Service Equipment.

Mounted Infantry.—The present khaki cord breeches should be made of stouter material and cut like knickerbocker breeches to prevent them splitting across the knees and seat.

Putties to be bound for two feet round lower edge with leather to prevent fraying from stirrup leathers.

Only light men should be selected for a course of Mounted Infantry. The men sent up were nearly all very heavy powerful men, much heavier than necessary.

Field Engineering.—The actual Coolie Corps sent up also were not

[1] Brought to notice of Director-General, Contracts and Registration, by the Principal Medical Officer, His Majesty's Forces in India.

always of the best stamp to stand the exceptional rains of Sikkim. All these various causes combined to make the road cost a good deal more than it need have done.

Supply and Transport.—Tarpaulins are weighty and wear out soon. Willesden rot-proof canvas is lighter and more durable.

The old pattern 45lb. *bell-tent* is much more suitable and economical than the 20lb. tents authorised for mule corps. The 45lb. tent holds twelve drivers easily. The 20lb. tent barely accommodates four.

Fodder and Kits.—It was found that, instead of each animal carrying a proportion of its fodder for the day, a custom which led to sore backs, it was better to carry this in bulk on separate mules, and that each driver divided his kit in three waterproof bags, and thus distributed his kit over the three mules in his charge. This saved much transport and worked satisfactorily.

The supplies sent up were on the whole very good except the *rum*, which was of inferior quality and taste.

To guard against deterioration from the heavy rains, perishable articles were sealed in tins; this saved much loss and proved satisfactory.

Some *emergency rations* for the troops might also have been given, as well as a ration of Erbswurst consolidated soup, both of which would have been found most useful for issue on occasions when fuel was scarce and ordinary food difficult to cook.

The material of the warm *pyjamas* issued to native troops is not good, and soon wears out and tears easily. The life of a pair of pyjamas on service is only about two months. Puttoo pyjamas, costing less, were found to be far more durable.

Poshteens, when issued to British troops, should be of larger size than those supplied.

The *waterproof sheets* of brown material issued to the Fusiliers were unsatisfactory; the old pattern white waterproof sheet was found superior.

Medical.—The report of Lieutenant-Colonel Waddell, C.I.E., I.M.S., Principal Medical Officer to the Force, together with the Sanitary Report on the Lines of Communication, by Major Aldridge, R.A.M.C., is attached, and I have little to add thereto.

The medical arrangements with the Force worked quite well and were adequate.

The following few points I would, however, mention:—

(1) That all British and Native Field Hospitals sent on any campaign should be so organised that they can at once be split up into sections without any further demand for extra establishments to enable them to act independently when required.[1]

(2) The regulation dooly and stretchers were not suitable to mountain operations, being too heavy and cumbersome. The Amesbury dooly was found light and serviceable, and Major Aldridge's hammock was found successful in place of the blanket stretchers.[2]

(3) The formation of a small corps of hill bearers, suitable for works on high mountains, would be useful, as the ordinary dooly bearer is quite useless above 9,000 feet.[3]

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[1] All essential *personnel* and all *material* are capable of this division already.
[2] Further trials of these and of other ambulance appliances are being made.
[3] Under consideration.

APPENDIX I.

METEOROLOGICAL OBSERVATIONS, BY MAJOR A. R. ALDRIDGE, R.A.M.C.

(*Chumbi Rainfall and Temperature.*)

The rainfall of Gangtok, as recorded by the Meteorological Department of Bengal, is 146·36 inches (average of four years) and of Yatung, in the Chumbi Valley, 57·01 inches (average of three years).

The following records of rainfall and temperature were made during the late expedition:—

CHUMBI RAINFALL AND TEMPERATURE.

Date	Rainfall Inches (recorded at 8 a.m.).					
	January	February	March	April	May	June
1904						
1st	..	..	..	·01	·02	·00
2nd	..	..	..	·24	·04	·01
3rd	..	..	..	·20	·01	·00
4th	..	..	..	·36	·00	·30
5th	..	..	..	·00	·02	·20
6th	..	..	..	·77	·54	·05
7th	..	..	..	·00	·03	·02
8th	..	..	..	·00	·15	·00
9th	..	*Nil.* ..	..	·28	·18	·00
10th	..	..	..	·01	·01	·00
11th	..	..	..	·17	·11	·05
12th	..	..	..	·45	·02	·51
13th	..	..	..	·22	·21	·27
14th	..	..	..	·21	·15	·32
15th	*Nil.* ..	..	..	·91	·10	·42
16th	..	..	..	·71	·16	·35
17th	..	..	..	·09	·24	·00
18th	..	February 17 to March 18, 3·0 ..	..	·00	·00	·19
19th	..	..	·28	·00	·53	·01
20th	..	..	·47	·00	·00	·41
21st	..	..	·01	·00	·00	·52
22nd	..	..	·00	·12	·00	·04
23rd	..	..	·01	·40	·00	·45
24th	..	..	·75	·49	·21	·22
25th	..	..	·00	·63	·02	·50
26th	..	..	·00	·02	·01	·20
27th	..	..	·00	·09	·97	·30
28th	..	..	·00	·00	·99	·00
29th	..	..	·00	1·31	·38	·63
30th	..	..	·00	·00	·00	·10
31st	..	..	·06	..	·00	..
Total ..	..	4·58		7·69	5·55	6·07

CHUMBI RAINFALL AND TEMPERATURE.—*Continued.*

Date	Recorded at 9 a.m. Rainfall inches	Recorded at 9 a.m. Temperature of air	Date	Recorded at 9 a.m. Rainfall inches	Recorded at 9 a.m. Temperature of air
1904.			1904		
July 1st	·35	59	August 1st ..	·07	57·2
,, 2nd	·15	59	,, 2nd ..	·37	..
,, 3rd	·05	..	,, 3rd ..	·09	..
,, 4th	·02	60	,, 4th ..	·04	..
,, 5th	·05	..	,, 5th ..	·27	..
,, 6th	·00	..	,, 6th ..	·64	..
,, 7th	·05	60	,, 7th ..	·15	..
,, 8th	·06	60·8	,, 8th ..	·07	..
,, 9th	·06	60	,, 9th ..	·20	..
,, 10th	·02	60	,, 10th ..	·08	..
,, 11th	·01	60·8	,, 11th ..	·09	..
,, 12th	·05	60·8	,, 12th ..	·22	..
,, 13th	·14	60·8	,, 13th ..	·04	..
,, 14th	·02	59	,, 14th ..	·08	..
,, 15th	·11	59	,, 15th ..	·02	..
,, 16th	·66	59	,, 16th ..	·04	..
,, 17th	·25	60	,, 17th ..	·19	..
,, 18th	·04	59	,, 18th ..	·14	..
,, 19th	·06	60	,, 19th ..	·19	..
,, 20th	·05	59	,, 20th ..	·00	..
,, 21st	·28	59	,, 21st ..	·01	..
,, 22nd	·06	59	,, 22nd ..	·14	..
,, 23rd	·14	59	,, 23rd ..	·02	..
,, 24th	·46	59	,, 24th ..	·01	59
,, 25th	·21	59	,, 25th ..	..	60
,, 26th	·43	59	,, 26th ..	·06	59
,, 27th	·26	58	,, 27th ..	·01	59
,, 28th	·34	57·2	,, 28th ..	·20	58
,, 29th	·26	57·2	,, 29th ..	·10	59
,, 30th	·04	58	,, 30th ..	·28	59
,, 31st	·06	58	,, 31st ..	·28	58
Total ..	4·68	..	Total ..	4·10	..

CHUMBI RAINFALL AND TEMPERATURE.—*Continued.*

Date	Recorded at 9 a.m.			Date	Recorded at 9 a.m.		
	Rainfall inches	Tempera-ture of air	Minimum tempera-ture		Rainfall inches	Tempera-ture of air	Minimum tempera-ture
1904				1904			
Sept. 1st ..	·12	57·2	..	Oct. 1st ..	·01	48·2	36·5
,, 2nd ..	·33	57·2	..	,, 2nd ..	·01	48·2	36
,, 3rd ..	·02	59	..	,, 3rd ..	·01	48·2	37
,, 4th ..	·05	57·2	..	,, 4th ..	·01	48·2	37
,, 5th ..	·40	57·2	..	,, 5th ..	·02	49	38
,, 6th ..	·40	57·2	..	,, 6th ..	·01	50	39
,, 7th ..	·10	57·2	..	,, 7th ..	·01	50	40
,, 8th ..	.01	57·2	..	,, 8th ..	·00	50	43
,, 9th ..	·32	59	..	,, 9th ..	·00	50	44·5
,, 10th ..	·07	57·2	..	,, 10th ..	·04	50·8	42·5
,, 11th ..	·36	57·2	..	,, 11th ..	·06	49·5	46·5
,, 12th ..	·05	55·4	..	,, 12th ..	·00	51·5	44
,, 13th ..	·14	55·4	..	,, 13th ..	·00	49·5	45
,, 14th ..	·26	57·2	..	,, 14th ..	·00	50·5	44
,, 15th ..	·07	57·2	..	,, 15th ..	·00	45·5	42
,, 16th ..	·06	57·2	..	,, 16th ..	·00	..	..
,, 17th ..	·05	57·2	..	,, 17th ..	·00	..	..
,, 18th ..	·01	57·2	..	,, 18th ..	2·22	..	..
					(snow)	..	..
,, 19th ..	·03	57·2	..	,, 19th ..	·49	..	..
,, 20th ..	·00	57·2	..	,, 20th ..	·00	..	..
,, 21st ..	·03	57·2	..	,, 21st ..	..	..	..
,, 22nd ..	·68	57·2	..	,, 22nd ..	..	..	..
,, 23rd ..	·01	51·8	..	,, 23rd ..	..	..	..
,, 24th ..	·05	55·4	50·5	,, 24th ..	..	..	..
,, 25th ..	·94	53·6	50	,, 25th ..	..	..	..
,, 26th ..	1·12	52·8	44	,, 26th ..	..	..	..
,, 27th ..	·01	52·8	45	,, 27th ..	..	..	..
,, 28th ..	·01	52·8	43	,, 28th ..	..	..	..
,, 29th ..	·01	52·8	42	,, 29th ..	..	..	..
,, 30th ..	·01	50	38·5	,, 30th ..	..	..	..
				,, 31st ..	..	..	..
Total ..	5·69	..	..	Total ..	2·89	..	..

APPENDIX II.

METEOROLOGICAL OBSERVATIONS.

GYANTSE TEMPERATURE.

Date	TEMPERATURE (recorded at 8 a.m.)		Date	TEMPERATURE (recorded at 8 a.m.)	
	Maximum	Minimum		Maximum	Minimum
1904.			1904.		
April 1st	..	..	May 1st	78	33
„ 2nd	..	..	„ 2nd	67	33·5
„ 3rd	..	..	„ 3rd	48	25
„ 4th	..	..	„ 4th	70	28·5
„ 5th	..	..	„ 5th	80	31
„ 6th	..	..	„ 6th	78	36
„ 7th	..	..	„ 7th	73	29
„ 8th	..	..	„ 8th	81	32
„ 9th	..	..	„ 9th	78	37
„ 10th	..	..	„ 10th	76	24
„ 11th	..	..	„ 11th	75	30
„ 12th	..	..	„ 12th	74	33
„ 13th	..	..	„ 13th	75	31
„ 14th	..	..	„ 14th	79	37
„ 15th	..	..	„ 15th	86	34
„ 16th	..	..	„ 16th	89	34
„ 17th	..	..	„ 17th	79	35
„ 18th	..	..	„ 18th	..	33
„ 19th	..	27	„ 19th	71	31
„ 20th	..	30	„ 20th	73	28·5
„ 21st	72	25·5	„ 21st	79	28
„ 22nd	82	31·5	„ 22nd	75	27
„ 23rd	77	31·5	„ 23rd	80	39
„ 24th	75	29	„ 24th	85	35·5
„ 25th	72	31·5	„ 25th	81	35
„ 26th	69	30·5	„ 26th	79	34
„ 27th	77	32	„ 27th	..	41
„ 28th	..	39	„ 28th	70	45
„ 29th	60	29	„ 29th	80	41
„ 30th	73	25	„ 30th	83	38
			„ 31st	82	37

GYANTSE RAINFALL AND TEMPERATURE.

Date	Recorded at 8 a.m. Rainfall inches	Temperature Maximum	Temperature Minimum	Date	Recorded at 8 a.m. Rainfall inches	Temperature Maximum	Temperature Minimum
1904				1904			
June 1st ..	..	83	38	July 1st ..	·02	73	48
,, 2nd ..	..	75	41	,, 2nd ..	·18	75·5	43
,, 3rd ..	..	70	39	,, 3rd ..	·00	75	46
,, 4th ..	..	85	40	,, 4th ..	·00	78	46
,, 5th ..	..	81	45	,, 5th ..	·00	78	52
,, 6th ..	..	71	44	,, 6th ..	·00	75	52
,, 7th ..	..	81	37	,, 7th ..	·02	81	50
,, 8th ..	..	82	41·5	,, 8th ..	·01	75	49
,, 9th ..	..	89	44	,, 9th ..	·05	82	45
,, 10th ..	..	75	39	,, 10th ..	·00	83	46
,, 11th ..	..	73	39	,, 11th ..	·00	89	53
,, 12th ..	..	70	43	,, 12th ..	·23	80	51
,, 13th ..	..	79	44	,, 13th ..	·01	62	49
,, 14th ..	..	77	45	,, 14th ..	·55	69	40
,, 15th ..	..	72	42	,, 15th ..	·35	67	42
,, 16th ..	..	80	45	,, 16th ..	·11	61	48
,, 17th ..	..	82	48	,, 17th ..	·00	68	42
,, 18th ..	..	81	47	,, 18th ..	·00	65	43
,, 19th ..	..	81	47	,, 19th ..	·00	74	47
,, 20th ..	..	77	43	,, 20th ..	·00	75	48
,, 21st ..	..	63	46	,, 21st ..	·06	72	47
,, 22nd ..	..	70	44	,, 22nd ..	·10	68	55
,, 23rd ..	..	76	45	,, 23rd ..	·00	70	47
,, 24th ..	..	80	46	,, 24th ..	·00	72	44
,, 25th ..	..	79	47	,, 25th ..	·70	68	43
,, 26th ..	..	78	48	,, 26th ..	·02	68	42
,, 27th ..	·00	79	49	,, 27th ..	·00	71	42
,, 28th ..	·55	76	44	,, 28th ..	·00	73	41
,, 29th ..	·04	68	43	,, 29th ..	·00	72	43
,, 30th ..	·12	65	49	,, 30th ..	·00	73	44
				,, 31st ..	·00	73	44
Total ..	·71	..	..	Total ..	2·36	..	..

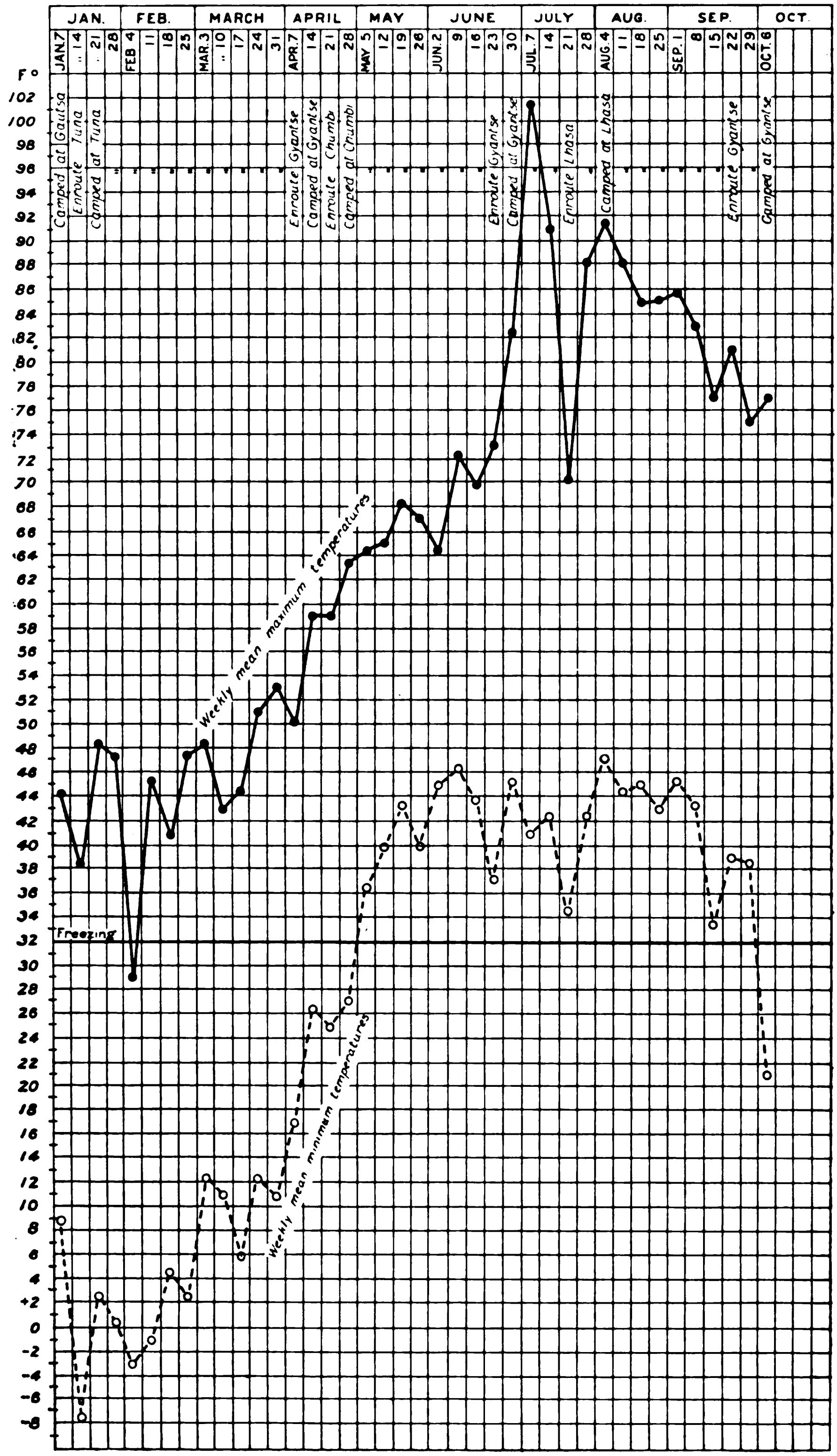
Gyantse Rainfall and Temperature.—*Continued.*

Date	Recorded at 8 a.m.			Date	Recorded at 8 a.m.		
	Rainfall inches	Temperature			Rainfall inches	Temperature	
		Maximum	Minimum			Maximum	Minimum
Aug. 1st ..	·00	75	47	Sept. 1st ..	..	64	43
,, 2nd ..	·00	75	44	,, 2nd ..	..	70	44
,, 3rd ..	·07	76	42	,, 3rd ..	..	64	40
,, 4th ..	·60	78	43	,, 4th ..	..	68	42
,, 5th ..	·50	72	45	,, 5th ..	..	67	39
,, 6th ..	·18	60	46	,, 6th ..	..	69	43
,, 7th ..	·19	73	44	,, 7th ..	..	61	40
,, 8th ..	·70	59	39	,, 8th ..	..	67	44
,, 9th ..	·16	59	39	,, 9th ..	..	68	43
,, 10th ..	·00	68	45	,, 10th ..	..	57	..
,, 11th ..	..	69	46	,, 11th ..	..	58	..
,, 12th ..	..	63	46	,, 12th ..	..	61	..
,, 13th ..	..	70	..	,, 13th ..	..	60	..
,, 14th ..	..	67	47	,, 14th ..	..	64	..
,, 15th ..	..	63	45	,, 15th ..	..	67	..
,, 16th ..	..	73	49	,, 16th ..	..	68	..
,, 17th ..	..	75	46	,, 17th ..	..	67	..
,, 18th ..	..	..	42	,, 18th ..	..	58	30
,, 19th ..	..	69	45	,, 19th ..	..	..	40
,, 20th ..	..	74	44				
,, 21st ..	..	73	41				
,, 22nd ..	..	73	40				
,, 23rd ..	..	72	42				
,, 24th ..	..	72	43				
,, 25th ..	..	72	44				
,, 26th ..	..	62	43				
,, 27th ..	..	63	39				
,, 28th ..	..	67	43				
,, 29th ..	..	69	42				
,, 30th ..	..	63	38				
,, 31st ..	..	65	44				
Total ..	2·40	..	..				

APPENDIX III.

Temperatures Experienced in the Tibet Mission Force, 1904.

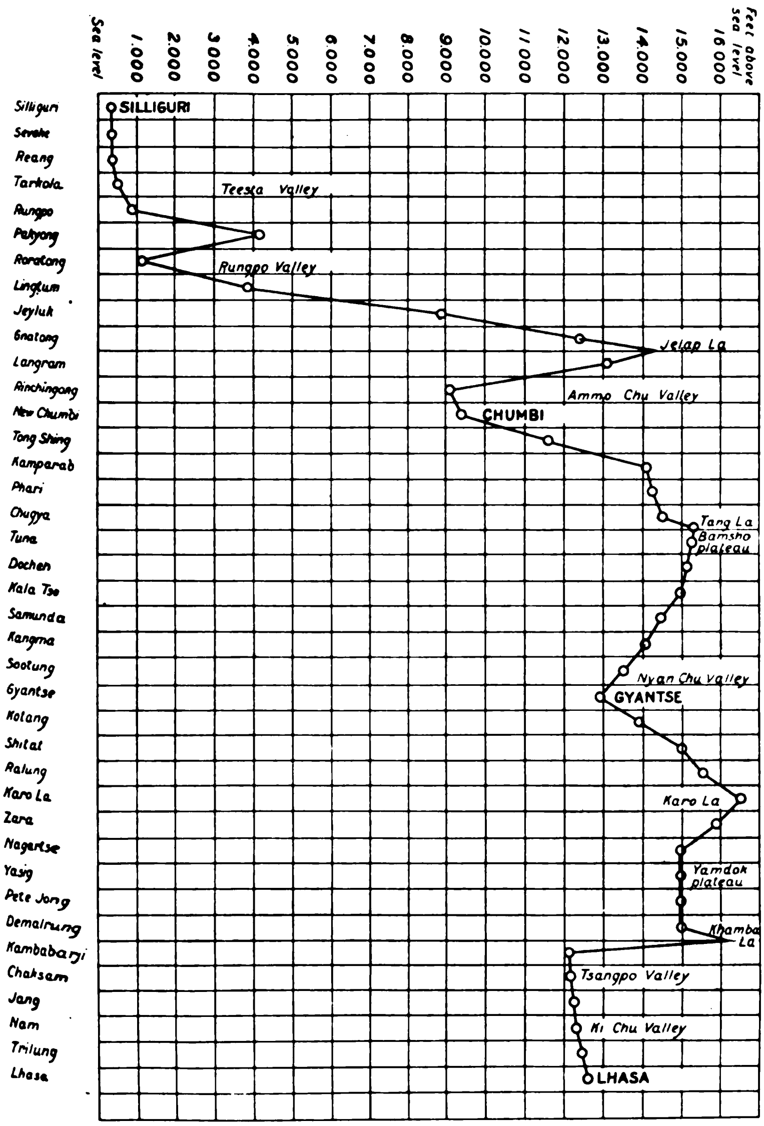
(Recorded by Captain T. B. Kelly, I.M.S.)



APPENDIX IV.

CHART OF ALTITUDES TRAVERSED BY THE TIBET MISSION FORCE.

(Compiled by Captain T. B. Kelly, I.M.S.)



APPENDIX V.

WASTAGE[1] IN OFFICERS AND MEN OF THE TIBET MISSION FORCE.

European Officers of British and Native Regiments.

Period	Average strength for the period	Admissions	Deaths[2]	Invalids	Killed in action
From November 14th, 1903, to December 31st, 1904	77	40	2	..	4
Ratio per 1,000	..	519·5	25·97	..	..
Average annual strength ..	89	40	2	..	..
Ratio per 1,000	..	449·4	22·47	..	..

British Troops.

Period	Average strength for the period	Admissions	Deaths[2]	Invalids	Killed in action
From January 1st, 1904, to November 4th, 1904	285	181	3	..	..
Ratio per 1,000	..	635·1	10·53	..	..
Average annual strength ..	242	181	3	..	..
Ratio per 1,000	..	747·9	12·40	..	..

Native Troops.

Period	Average strength for the period	Admissions	Deaths[2]	Invalids	Killed in action
From March 13th, 1903, to December 31st, 1904	2,024	3,036	120	34	34
Ratio per 1,000	.	1,500·0	59·29	16·80	..
Average annual strength ..	3,627	3,036	120	34	..
Ratio per 1,000	..	837·1	33·09	9·37	..

[1] As supplied by Principal Medical Officer, His Majesty's Forces in India, to Intelligence Branch, Army Headquarters.
[2] Excluding killed in action.

Extracts, &c.

THE DUTIES AND RESPONSIBILITIES OF OFFICERS OF THE ROYAL ARMY MEDICAL CORPS WITH REGARD TO THEIR MEN.[1]

By Lieutenant-Colonel E. M. WILSON, C.B., C.M.G., D.S.O.
Royal Army Medical Corps (R.P.).

Gentlemen,—When your indefatigable Secretary kindly asked me to contribute a paper to this Society, I decided after consideration that it would be best for the "cobbler to stick to his last," and that I would try to put forward, if agreeable to you, some notes on the duties and responsibilities of an Officer of the Corps in relation to his men. I was led to the selection of this subject:—

First, because I understand it has not previously been presented to this Society.

Second, because we have at the present time a large number of young officers to whom it must be new and, I should hope, interesting, and

Third, because I trust I may be pardoned for hinting that there really does seem to be among certain officers who are not juniors, a somewhat limited conception of the position in which they stand with regard to the men under their command.

Seated as I have been for several years, something like a spider in the centre of a web, digesting those monthly Returns of men, which we all know so well, from all stations at home and abroad, and receiving all kinds of reports, requisitions and demands, one soon learns to observe certain differences in the progress and general welfare of the various companies and detachments, and to understand how immensely they are affected by the personality of their Commanding Officers.

One Company seems to work without friction, there is a constant succession of young soldiers getting on, passing their various examinations and qualifying as nurses, clerks, cooks, compounders, &c., and yet finding time to win football and cricket matches and get up all sorts of entertainments. Another seems unfortunately to have collected all the "bad hats" in the Corps, and

[1] A lecture given to the Aldershot Army Medical Society, November 10th, 1905.

the records of crimes and punishments are dreary reading. It is the same thing in regiments and even in different Companies of the same regiment. I remember years ago, when I was living with a well-known Infantry Battalion in Malta, a friend of mine whose simple creed in life was that "B Company means the best Company"; and while he commanded it it *was* the best Company, best in musketry and marching, best in discipline, messing and boat-racing, and, what is no mean criterion of tact and management, the Company with the least disturbance in the married quarters. Again, I was not for nine months the Medical Officer of what is commonly known as "the glass house" at this Station, without observing that the number of men admitted to that establishment varied considerably among the different Corps in the Command, and the seniors here know very well that a large proportion of prisoners does not necessarily imply a higher standard of discipline. I think Prince Bismarck is credited with the remark that "Every country has the Jews that it deserves." Perhaps it is going too far to say that every Commanding Officer has the *men* which he deserves, but I daresay that officers who have *good* companies or regiments will agree that there is some truth in the statement.

The three great points to which I desire to draw the attention of my brother officers, and especially the juniors, are:—

(1) Their responsibility with regard to their men.

(2) Their powers, which are very considerable, and the full after-effects of which, I am sure, are not always realised.

(3) The means at their disposal.

As regards the first, I will not detain you long. It is a trite but true observation that the officer stands to the man *in loco parentis*, and the soldier, especially the young soldier, has a right to come to his officer for advice and assistance. On that advice he may probably act and the officer should not think it a bore and a nuisance; and I trust you will not think me a bore and a nuisance if I give you just one instance in actual life of the sort of advice which should *not* be given. A young Non-commissioned Officer wanted to marry. He went to his Commanding Officer and asked if he should wait till he could get on the strength. His Commanding Officer said, "Do as you like, it's nothing to me, I dare say you will get on the Establishment before long." On that advice the man married, and now there is not the least chance of his getting on the Establishment till he becomes a Staff-Sergeant. That was a careless piece of advice, which will cause poverty and discomfort to a silly young couple for several years. Of course you may say

that the man should have known better, but you must remember that they are very young, only partially educated, and many of them really believe that their officers *are* wiser than themselves.

One other point I may perhaps bring to your notice before I leave this subject, and that is the possibility of doing good in the case of men transferring to the Reserve. I am getting just now every day letters from Reservists, some written from the workhouse, begging to be allowed to rejoin the Colours because they cannot obtain employment. I dare say you all know that this cannot be allowed, except in very few and isolated cases of an exceptional nature which have to be specially submitted to the War Office. The cases are so numerous that I have been obliged to make out a stereotyped reply to save my clerks labour in writing, and it is the same in other branches of the Service, for our men have offered to go into any other branch of the Army and have been refused. I know that the men are often headstrong. They want their liberty, they have some money in their pockets and off they go; and in a fortnight's time sit down and write to me to beg, uselessly, to come back. Perhaps with the winter coming on and the facts just stated at their disposal, our officers might by a little sound advice induce men to extend their service and thus save good soldiers for the Army, and prevent much subsequent misery.

I think, with your permission, I will leave the powers of the Commanding Officer to the last, and say a few words on the means at his disposal for influencing the lives of his men. Now the men are, as I said before, very young, partially educated, not at all philosophical, very human, and, like other human beings, influenced in two ways, by rewards and punishments.

As to rewards, the greatest that can be offered to an intelligent young man is undoubtedly to explain to him the advantages of the various sections of the Corps, and to encourage and assist him to pass the necessary examinations. I do not think there is any other branch of the Army which offers such advantages to a young fellow who will work hard and keep straight. I have watched the careers of several young Non-commissioned Officers through the various ranks with great interest, although I have never seen them. During the late war the progress was phenomenal, and though there was necessarily a block in the higher ranks on the conclusion of peace, the surplus has now been absorbed, and promotions will begin again to Staff-Sergeants in January next. As to the junior ranks, we made over seventy Lance-Corporals in last Corps Orders, and in next January we shall have a lot more

vacancies. We have lately tried to explain the advantages to be gained by self-improvement in Corps orders, but if there is anything that is not quite clear, I hope that some of the members will ask questions at the end of this paper.

I will not do more than allude to other methods of reward which are in the power of every Commanding Officer, such as interesting oneself in the sports and games, improvements in messing, &c., &c., as I know that they are fully understood and acted on, but there is one thing which I might mention, because I think it is not universally known, and that is the value of the written report of a Commanding Officer in favour of a man, especially in cases of unusually good service of an exceptional nature. Over and over again when I was in Victoria Street, officers home from South Africa would come and see me and say, "Oh, by-the-bye, there was a man in my Bearer Company or Hospital that you ought to have done something for. The way he worked was positively splendid," and so on. I would reply, "My dear fellow, why on earth didn't you report it, and I would have promoted him." The answer usually was, "I did not think it was any use," or, "I had no time." I know it is always a bore to sit down and write a formal report, and also that on active service it must sometimes be almost impossible to find time, or even paper, for such a purpose, yet our Surgeon-General here, and many others, *did* manage it somehow, and the result was that we got, I believe, a larger proportion of Distinguished Conduct Medals than any other branch of the Army.

You will remember that ours is a record office for the whole Corps, and in order that every man in every detachment shall have absolutely fair and equal treatment, it is best to rely entirely on permanent records and official reports. I could tell you countless stories where men have owed their advancement to the kindly thought of officers, often of other branches of the Army, who have taken the trouble, unasked, to send us reports of good services which have been rendered. A wounded officer coming down the Nile, first brought to notice a man who is now a Staff-Sergeant. Two men at the Curragh rescued a drowning gunner and brought him back to life by artificial respiration, reported by the Commandant, Royal Artillery. The men who did such good work during the terrible eruptions at Martinique and St. Vincent, reported by His Excellency the Governor, and many others. I am sure, therefore, that no one would grudge a few minutes spent in writing, in suitable cases, when the action may affect the whole subsequent career of a Non-commissioned Officer or man.

So much for the rewards. Now about the punishments. I once heard a lady give the following advice to her children. "Don't ring the bell often, but when you do, ring as if you meant it." I do not know whether it was her own idea or whether she learnt it from some one else, but I am quite sure that she enunciated the secret of all good government, and that if a man constantly observed this simple axiom, he could govern anything, from a Bearer Company to the Indian Empire. And this maxim is most applicable to punishment. One might say, "Don't punish often, but when you do, let it be a sharp lesson," and to this I would add, "Always try to realise the full effect of the sentence you are awarding."

I would like, with your permission, to lay some little stress on this point, and it is on this account that I thought it best to defer the consideration of the *power* of the Commanding Officer till the last, because it is only in an office like ours that the full after-effects of a punishment are seen, and I am quite sure that in many instances the results are not realised. Officers have often come to me when I was in Victoria Street and said, "Look here, when I did so-and-so I had no idea that the man's whole career would be spoiled. He deserved to be punished, but not to be ruined. Can't you get it altered?"

Well, that is the worst of a permanent record of character, and it is a very difficult matter to get an entry expunged, especially after some years have elapsed since the award. An instance occurred only just lately. A man had a clear sheet throughout his service, until, on some unfortunate day, he was "severely reprimanded" by his Commanding Officer. That was several years ago, and he has had no entry since. Now the effect of that one entry will be, so far as I am at present aware, to debar him from receiving an "exemplary" character on discharge; and the want of that character will for ever prejudicially affect his obtaining employment in civil life. This perhaps is an exceptional case, and I trust I shall not frighten any junior officer from exercising, to the full extent, the powers which he possesses. I only want officers to realise the full ultimate effect of the sentence, especially on Non-commissioned Officers and old soldiers, and when that is done, the more promptly the decision is given the better for discipline.

Perhaps a few notes may be of service which I made when I was in medical charge of the prison, and when it was my duty to give a brief lecture to each class of young officers passing through the Depôt.

(1) All punishments awarded to Royal Army Medical Corps are more severe than a similar sentence to Infantry of the Line.

(2) "C. B." means loss of Corps pay as well as confinement to barracks, and may involve reduction to a lower rate of Corps pay, which would certainly last six months, probably more now we have so many qualified men; and possibly reversion to the General Duty Section, which might be permanent.

(3) "Cells" mean loss of all pay during the sentence, and probable reduction to a lower rate of service pay afterwards. Also postponement of promotion for at least six months, probably twelve.

(4) One case of drunkenness postpones the admission of a man to the Nursing Section for at least six months.

(5) Two cases render a man for ever ineligible for the Queen Alexandra's Imperial Military Nursing Service.

(6) Reversion from Lance rank entails twelve months' probation before the stripe can be restored.

(7) Reduction by court-martial prevents a man from being considered for re-promotion for two years.

(8) With regard to these promotions and appointments to Lance rank, I would ask officers to compare the effect of supersession on a man of our Corps with the effect on a man passed over in an Infantry battalion. In a regiment a man at the worst is only passed over by two or three of his comrades, and in some cases the Lance stripe is on and off again with such rapidity that it must keep the tailors busy.

I have known a Lance-Corporal come into prison as a private, for a short sentence, out and re-appointed, reverted and into prison again, all in six weeks; and I have no doubt that as he is a fine-looking intelligent young fellow he is now a Corporal—unless he has deserted.

With us promotions are made at intervals, and I hope for the future they will be made regularly every quarter, and vacancies which have occurred are filled up in all ranks. The result is that we get lists of considerable length. In the last Corps Order, which was, however, exceptional, we made over seventy Lance-Corporals. Imagine, therefore, the position of a man who is left behind, and the effect on his prospects of being a Sergeant-Major in after years. Some officers may perhaps consider that the effects of our system are too severe, but it must be remembered that we are in a position to select the best, and that when one is considering the interests of men throughout the whole Corps, we *must* give preference to the men with clear defaulter sheets who are well reported on.

But it is in the senior ranks and with the re-engaged men that the after-effects of punishment are so severe; and in these cases it is not a question of rules affecting the Royal Army Medical Corps, but laws made for the whole Army regulating the assessment of characters, pensions and rewards. I have already referred to the effect of a single reprimand as possibly preventing the award of an "exemplary" character. Punishments involving loss of service necessarily affect pensions, and when it is remembered that pensions are assessed at twenty-one years' service, according to the number of years a man has been a Non-commissioned Officer *at that time*, it will be evident how serious may be the result of postponing a man's promotion to the rank of Sergeant.

As regards rewards, the Good Conduct Medal carries with it a gratuity of £5 to Non-commissioned Officers, and the Meritorious Service Medal (of which we have now, I am glad to say, eleven) £10 a year for life. These both depend essentially on character.

The Distinguished Conduct Medal has attached to it a gratuity of £20, or an additional pension of 6d. per diem, and the same amount for each additional clasp; and the Victoria Cross an annuity of £10 and £5 for each additional clasp.

All these, as well as all War Medals, except the Victoria Cross, which is dealt with separately, may be forfeited by sentence of court-martial, and *must* be forfeited for ever on discharge for misconduct.

On this question of punishment I would venture to give one very short and simple piece of advice to my juniors. When you find it necessary to inflict a serious punishment on a Non-commissioned Officer or old soldier (a re-engaged man) wait a moment, send for his attestation paper, look up his service and see what the effect of your award will be. Do not for a moment think I am asking you to be lenient; only do not strike in the dark without knowing what you are doing.

There is only one other point to which I should like to draw your attention, and that is recruiting—the enlistment of men for our own Corps. Here we have an immense power of selection placed in our hands, and I regret to say that it is often not exercised. Often and often I have had complaints from officers that they have "some rotten chaps who ought never to have been enlisted," and yet some Medical Officer or, at any rate, medical man must have passed them as fit and "suitable for the Royal Army Medical Corps." The Recruiting Regulations lay down that "Medical Officers will satisfy themselves that the recruit can read not only

printed matter but plain handwriting, and that he understands what he reads. Special care will be taken that only men of good education and intelligence are enlisted."

You see that the greatest discretion is vested in the Medical Officer. If he does not consider a man "suitable" there is an end of it. The recruit can go into another branch of the Army. And remember we are not obliged to go into the highways and byways to compel them to come in. We can pick and choose the best. We are now in excess of our authorised establishment, and we had to obtain special permission from the War Office to recruit above establishment.

We have been allowed a margin of 100 men, and if that is exceeded we shall have to stop, so I would ask all officers who have the interests of the Corps at heart, to send us only the best. Among the best I would, from some considerable experience, place transfers from other Corps, especially at foreign stations.

Some of our best men have been transfers of men perhaps originally employed as regimental orderlies or stretcher bearers, men with one or two years' service in a regiment, well disciplined, of good character, who like the work and who often give up a Lance stripe to come to us. These men should be encouraged. A notable instance was a Sergeant in the Guards, who is now a Sergeant in our own Corps.

I hope my audience will not think that this is a dull, uninteresting subject, and I also trust most sincerely that none of my brother officers will ever think that a knowledge of military law and interior economy is derogatory to the highly-trained scientific medical man. Remember that it was our ambition and constant demand to be one united Corps with command of our own men. Now that after five-and-twenty years of gradual evolution we have obtained our ambition, do not let it ever be said of any of us that we do not know how to exercise our powers. Nothing is so bad for discipline as the award of a sentence which has to be altered. I remember when I was a very junior officer, being present when a Senior Surgeon-Major, who had taken up military law somewhat late in life, was "telling off" a prisoner. After referring to books and papers he delivered his judgment. "You can't do it, sir," replied the prisoner with the utmost respect, and the man was right! Well, that was not conducive to good discipline. Still we are none of us perfect and every one may make mistakes, and it may be a comfort to my juniors to know that such mistakes are not unknown in other branches of the Service.

A court-martial, on which Royal Army Medical Corps Officers were not represented, tried a Corporal of our Corps and solemnly sentenced him to reduction to the rank of Lance-Corporal. There being no such rank it was impossible to execute the sentence, and the Corporal remained a Corporal still, in defiance of his judges. The remarks of the General and the Adjutant-General and the Judge Advocate-General on that court-martial were not pleasant reading for the President and members, and I have no doubt induced them to devote their serious attention to a branch of their profession which they had somewhat neglected.

Gentlemen, I remember an old Cavalry caution which was used in the Riding School before taking the horses over the bar. "Make much of your horses," the idea being that whenever anything difficult or out of the way was to be attempted, the horse, on whom so much depended, should be encouraged and taught that he and the man were going to do it together. Perhaps, in conclusion, I may venture to say to you, "Make much of your men"; not of course by pampering them, or even by inquiring too closely into their private or domestic affairs; but by taking a general interest in their prospects and welfare, and occasionally, when necessary, by a kindly word of advice. You will find it worth your while. I feel sure that there is not a Senior Officer of the Corps who cannot recall the figure of some Non-commissioned Officer or man (perhaps not always of the most immaculate character) who rendered him loyal service when very short-handed, or in some sudden emergency, or on active service, or when from some reason or other he was in a "tight place."

And our officers who have made themselves well-known names in science or administration will readily admit that part of their success was due to those human tools which they fashioned themselves, or found already prepared for their use by some former workman.

Reviews.

IGIENE NAVALE (NAVAL HYGIENE). By Dr. C. M. Belli, of the Italian Royal Navy, Professor of Hygiene at the Royal University of Padua. 1 vol. in 8vo. Price 10s. Postage 1s. 3d. extra. Published by the "Societa Editrice Libraria" of Milan.

It was with feelings of considerable diffidence that we undertook to review a manual of Naval Hygiene, and the more especially so when the book is written by one so specially qualified for a work of this kind as Dr. Belli, not only by reason of his having spent so much of his life at sea as a naval surgeon, but also because he is the author of numerous works on Naval Hygiene.

Dr. Belli's work is divided into two main parts, the first of which treats of the hygiene of the ship itself and the other of the hygiene of its *personnel*. Part I. may, therefore, not inaptly be described as a treatise on naval sanitary engineering, whilst Part II. deals only with those factors which have a direct bearing on the health and well-being of the sailor.

The introductory chapter consists practically of a historical review of hygiene as practised on board ship in the past, from the date of the discovery of the mariners' compass up to the periods of our own hospital-ships "Victoria-Emanuel" and "Coromandel."

PART I.

The first chapter ably describes, in language to be easily understood by all, the structure and the principal divisions and parts of a ship, whether the same be a man-of-war or a merchant vessel; the addition of numerous simple but appropriate diagrams also facilitates matters, even where any possible doubt as to the exact meaning of the text might occur to the tyro in nautical terms.

The cabins and men's quarters are now described, and several pages are devoted to the subject of overcrowding in the latter, and the limits permissible in this matter, even in a war-ship, where space is necessarily restricted, are strictly defined. The kitchens, ovens, and cooking arrangements are fully discussed, and in natural sequence the boilers and all machinery, whether of primary or secondary importance, are next described, and the relative merits of coal and petroleum as a source of thermic and mechanical energy are then compared from a hygienic point of view, greatly to the advantage of the fluid form of fuel.

A comprehensive study of the atmosphere, both outside and inside the ship, now follows, and also of the sea-water itself. The relative advantages and disadvantages of all materials employed in shipbuilding are next fully discussed, as are also the means for preserving them. The question of ventilation in a work of this kind is necessarily given due prominence, and the latest methods for artificial ventilation are fully described. Lighting, heating, cooling, and cold storage are next severally considered in detail. The all-important question of drinking water is fully gone into, and separate chapters are allotted to its collection, distil-

lation, preservation and purification. The various means for personal ablutions are shown, and "mechanical laundries" are described and advocated, provided they are worked by competent and skilful hands. The latrine accommodation is now described, and the various means for the convenient removal of all refuse, cinders, bilge-water, &c., are considered; these may be summed up as being on the system of "*tout à la mer.*"

The hospital, or sick bay, has a chapter to itself, and the author here lays down that a cabin should invariably be specially allotted as a medical inspection-room, which can also serve as the medical dispensary, as there are many inconveniences in the way of having to carry out medical inspections in the presence of all the other patients; he also recommends that a room should be allotted as an operation room, and another for isolation purposes, and that in small vessels, where only one room can be spared for this double duty, isolation should be given the preference, as, if properly constructed, this room should be capable of being readily disinfected should it be required for the performance of a capital operation.

Chapter xxi. may be aptly described as "cleanliness everywhere," but subject to certain restrictions and precautions, for instance, in shallow or tideless harbours the sea-water is full of common and pathogenic micro-organisms which may penetrate during the washing-down of the decks, &c., through small abrasions on the feet, which are common among sailors, and may be the means of transmission of infective surgical diseases, such as erysipelas, &c. Under these circumstances, a solution of soda in hot water is to be preferred for cleansing-down purposes.

The hygienic differences between naval and mercantile ships are now severally described, from a turret-ship to a submarine on the one hand, or from a magnificent liner to a small coasting sailing-vessel on the other.

The chapter on hospital ships is a short one, as the whole of the subject matter is condensed into four and a half pages. These hospital ships are roughly divided into three classes: (1) those accompanying a fleet; (2) those accompanying a military expedition; (3) those employed in bringing home invalids from the Colonies.

PART II.

The first chapter deals at some considerable length with the question of food and the alimentary value of the various rations. The succeeding ones are allotted to work (including diving operations), rest and sleep, clothing, bedding, and cleanliness. Then follows a discussion on the influences inseparable from navigation (*e.g.*, pitching and rolling, vibrations of the screw, sea-sickness, noises, &c.), voyages and expeditions to hot or cold stations, nostalgia, improved methods of dealing with recruits.

Epidemiology and general prophylaxis and disinfection are next treated at considerable length; these subjects are followed by chapters on a more particularised epidemiology and the prophylactic measures to be adopted in cases of infective diseases occurring on board ship, such as plague, malaria, yellow fever, beri-beri, &c., &c. These chapters are thoroughly up to date, as might be expected, and these again are followed by special articles on heat-stroke and on hemeralopia. The work terminates with a description of the various methods of aid to the wounded in naval engagements.

The work is essentially a practical manual, primarily written for naval and mercantile medical officers, but the first portion is also available as a book of reference for naval architects and for all commanders who have at heart the welfare of their crews and passengers. The book is freely illustrated, and the text, being unencumbered with unnecessary technical terms, makes very pleasant reading. It will doubtless shortly be found in the libraries of all Italian surgeons afloat, and it is well worthy of translation into other languages.

A Treatise on the Parasites and Parasitic Diseases of the Domesticated Animals. By Professor L. G. Neumann. Translated by George Fleming, C.B. Second Edition, revised and edited by Professor James Macqueen. London: Baillière, Tindall and Cox. Price 21s.

Of recent years parasitology has become of such paramount importance to investigators of disease that Professor Neumann's comprehensive work is one which has long been welcome. And the second English edition more than maintains its title to that welcome, not only from those engaged in the study of diseases of animals generally, but also from those dealing with diseases of man.

The parasites considered are almost exclusively those belonging to the animal kingdom. The vegetable parasites are represented here only by a few of the fungi. But even with this limitation the subject is a vast one, the literature of which is voluminous; consequently the work before us is of the nature of a text-book, collating the work of many observers, among whom Professor Neumann has himself furnished original work which has placed him in the forefront of those engaged in the study of the natural history of parasites. A bibliography at the end of the volume furnishes references which will enable those interested in particular parasites to prosecute their inquiries into more intimate details of natural history than can be dealt with in a manual whose scope is the nature, diagnosis and treatment of diseases.

After an introductory chapter on the nature of parasites and the general subject of parasitism, the work is divided into eight books, each devoted to the parasitic diseases of a particular region of the body. The description of the disease is preceded by that of the parasite to which it is due, accompanied by many useful drawings and diagrams illustrative of the natural history. The chapter dealing with the Acariases is especially to be commended in this connection, as also are the portions descriptive of the various worms. The hæmatozoa have not received so much attention, with the result that we miss details of some of the diseases which have latterly attracted considerable attention, such as the piroplasmoses and the trypanosomiases, these being dismissed with a nod of recognition. But even so, there is more to be learnt of the carriers of these diseases than the casual enquirer would gather from a reference to the index, which omits reference to some of the diseases touched upon in the descriptions of their vehicles.

Professor Macqueen is to be congratulated on having presented to English readers information which, until the appearance of this work, had been obtainable only upon reference to numerous monographs, chiefly

by continental writers. He has now placed many of these monographs within the knowledge of students; he would add to their indebtedness if he would in the next edition note in the bibliography the special points dealt with in the writings quoted, and would connect the whole with the text by means of reference numbers.

TRYPANOSOMES, TRYPANOSOMIASIS, AND SLEEPING SICKNESS. PATHOLOGY AND TREATMENT. By H. Wolferstan Thomas and Anton Breinl. And GLAND PUNCTURE IN TRYPANOSOMIASIS. By the late J. E. Dutton and J. L. Todd. Memoir XVI. of the Liverpool School of Tropical Medicine. Published for the University Press of Liverpool by Williams and Norgate. London. Price 12s. 6d. net.

Memoir XVI. of the Liverpool School of Tropical Medicine, which has just been published, contains two papers: (1) Trypanosomes, Trypanosomiasis, and Sleeping Sickness, by H. Wolferstan Thomas and Anton Breinl, and (2) Gland Puncture in Trypanosomiasis, by the late J. E. Dutton and J. L. Todd. The first paper is divided into two parts: Part I. deals with (*a*) the description of cases of sleeping sickness in man; (*b*) *Trypanosoma gambiense:* its effects when inoculated into various animals, and its morphology; (*c*) *Trypanosoma dimorphon;* (*d*) dourine, mal de caderas, surra; (*e*) bacteriological examination of blood, gland puncture, blisters, &c.; (*f*) cultivation experiments; (*g*) treatment. Part II. deals with pathological anatomy: (*a*) macro- and micro- scopical changes in man in four cases of sleeping sickness; (*b*) macro- and micro- scopical changes in the tissues of animals infected with *T. gambiense*, including the monkey, dog, rabbit, guinea-pig, and rat; (*c*) macro- and micro- scopical changes in the tissues of animals infected with *T. dimorphon*, including the monkey, dog, rabbit, guinea-pig and rat; (*d*) macro- and micro- scopical changes in the tissues of animals infected with *T. brucei*, *T. evansi*, and *T. equiperdum;* (*e*) summary of anatomical changes.

Within the last few years, research on this subject has been very active, and a considerable amount of work has been published. In this report, although no actually fresh lines have been opened up, yet those laid by previous investigators have been carefully followed out, and it is interesting to note that they entirely support the conclusions arrived at by the Sleeping Sickness Commission in Uganda. A considerable amount of what appears to us needless discussion, has taken place at home as to whether the trypanosomes are capable of causing the characteristic lesions met with in the brain, &c., of sleeping sickness cases. The authors, as a result of their observations, state that: "From these facts one must conclude that the lesions in the brain, cord and other organs, can be produced by the trypanosomes." With this we heartily concur. They further consider that the few cocci which they found in the brains of the cases examined were *post-mortem* contamination. It has also previously been shown (Report VI., Sleeping Sickness Commission) that this invasion took place in a certain proportion of cases of sleeping sickness shortly before death. As a result of their animal experiments the authors state that: "The further comparison of the trypanosomes found in (*a*) the cerebro-spinal fluid of Uganda sleeping sickness cases;

(*b*) the cerebro-spinal fluid and blood of the Congo Free State sleeping sickness cases; (*c*) the blood of Congo Free State 'trypanosoma fever' cases; and (*d*) the blood of Europeans infected in the Congo, confirms the previous observations that all these trypanosomes are identical in animal reaction and morphology with *T. gambiense* (Dutton)." They criticise the view of Plimmer, that the trypanosoma of Gambia fever and sleeping sickness are distinct. They say, "Must such a dogmatic conclusion as this result of only seventeen experiments, be accepted as to the differentiation of the parasite of 'Uganda' sleeping sickness from that of 'Gambia Fever'? The figures of this laboratory are entirely opposed to such a conclusion."

As regards treatment, the authors have tried arsenic, atoxyl and trypanroth, and they say, "That a combination of arsenic and of an improved form of trypanred would seem indicated in the further investigation of the cure of trypanosomiasis," and "That both arsenic and trypanred cause a hyper-leucocytosis, and that this condition has an effect on the parasites."

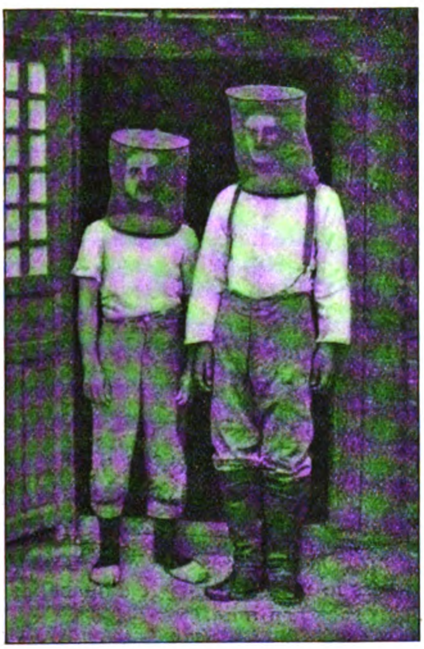
In the morbid anatomy of sleeping sickness it is to be noted that the authors have not observed the ulceration of the stomach due to breaking down of petechiæ under the mucous membrane described by the Sleeping Sickness Commission in Uganda, Report VI. In the paper on Gland Puncture in Trypanosomiasis, the authors record very satisfactory results obtained by the use of the method described by Lieutenant A. C. H. Gray, R.A.M.C., and Captain E. D. W. Greig, I.M.S. They say, "twenty-two natives coming from districts where the disease occurred, but all absolutely unsuspected of being cases of sleeping sickness, were chosen because of their more or less enlarged glands. These were punctured, and trypanosomes were found in the fluid in eight instances. A simultaneous examination of fresh cover-slip preparations only detected two of these cases, and by centrifugalising the blood only one additional was revealed."

The Liverpool School is to be congratulated on the excellent way in which the report is got up and illustrated.

Current Literature.

Mosquito Net Head Covering worn by the Japanese Army.—In *Le Caduceé* for November 18th, 1905, Surgeon-Major Matignon of the French Army, who was attached to the Japanese Army in Manchuria, describes a new form of headgear worn by the troops, which he himself also adopted as a protection against flies, which otherwise gave him no respite when quartered in Chinese houses.

During their last campaign in Manchuria the Japanese devised several means for the prophylaxis of malaria in accordance with the latest



hygienic principles. Malaria is not common in Manchuria, but mosquitoes abound there, and amongst the Japanese soldiers were a large number of men who had already become infected in Formosa, and who, by the intermediate agency of mosquitoes, might become a source of infection for their comrades.

In all the villages where the troops had to remain for any length of time, the drainage of marshy ground and the drying up of pools of water were undertaken by *corvées* of soldiers or of Chinese coolies. The

windows of houses in occupation were nearly always covered over with pieces of gauze fixed on frames, which, in their turn, were nailed to the frame-work of the window openings; rugs were also hung as portière-curtains over the doors of the rooms. By these means mosquitoes and flies, which are one of the plagues of Manchuria, were, to a certain extent, kept in check.

Each officer or man was also supplied with a small mosquito-net which protected only his head. This apparatus appears to have been very useful, for, after having been given a trial during the first summer campaign of 1904, it was re-issued to the troops for the summer campaign of 1905. The "head mosquito-net" is constructed on the principle of the Gibus opera-hat; it is bent in on itself for transport, but resumes its proper shape by means of a spiral steel spring. It consists mainly of a cylinder of coarse gauze or of mosquito-netting, and is about ten inches in diameter; the lower rim, through which the head passes, has attached to it a linen flap about eight inches deep, which can be adjusted to the neck by a running string. The head is very free in its movements inside this cage, which can be worn also during sleep. When folded up the "head mosquito-net" is only about half an inch thick and weighs under two ounces, and is carried under the flap of the knapsack.

This apparatus, which is practical, cheap, and not too fragile, appears to be worthy of the attention of military hygienists, as it may render marked service in expedition to tropical or sub-tropical countries.

J. E. Nicholson,
Lieutenant-Colonel (R.P.).

The Japanese Military Medical Service.—Staff-Surgeon J. Steiner (*Der Militarärzt*, Nos. 17 to 19) publishes a lecture on the Japanese Military Medical Service, delivered before the Society of Military Surgeons, Vienna, on April 3rd, 1905.

The following administrative appointments are made on Service:—

(1) A director-general as chief of the medical service in the field, on the staff of the Commander-in-Chief.

(2) A surgeon-general or principal medical officer to each Army, with a medical adjutant and two non-commissioned officers of the medical corps.

(3) A principal medical officer to each division with a medical adjutant, an apothecary, and two non-commissioned officers of the medical corps.

(4) A principal medical officer to each divisional command on the étappen line, with a medical adjutant, an apothecary and a non-commissioned officer.

Medical arrangements of units—

(1) To each Infantry Regiment (three battalions) are attached six medical officers, three non-commissioned officers and twelve men of the medical corps and forty-eight bearers. The latter wear a red armlet instead of the Geneva Cross.

(2) To each Cavalry Regiment (three squadrons) two medical officers, one non-commissioned officer and one man of the medical corps.

(3) To each Artillery Regiment (six batteries), three surgeons and three men of the medical corps.

(4) Other units in proportion.

Medical equipment—

(1) Each Infantry Battalion has two panniers containing medicines and surgical materials, and twelve stretchers. Two pack horses are allotted for the carriage of these articles.

(2) The Cavalry and technical corps are equipped with medical and surgical bags carried by the non-commissioned officers of the medical corps.

(3) The Artillery has the infantry panniers, carried, in the case of the Field Artillery, in a cart, and in that of the Mountain Artillery on a pack animal.

Field medical units—

To each division is allotted a "medical detachment," consisting of two bearer companies and a "central" or "dressing station" section, the whole commanded by a Captain of the train. To the central section belong the commandant, eight medical officers (one of whom is principal medical officer), one apothecary with three assistants, one quartermaster with a clerk, ten non-commissioned officers and twenty-six men of the medical corps, the necessary transport non-commissioned officers and soldiers for thirty-six pack horses, servants and grooms, in all eleven officers (all mounted), ninety-three men and forty-nine horses.

Each bearer company is divisible into two half companies of three sections, is commanded by a train Lieutenant, and has a strength of one officer and 155 men.

Further, six field hospitals are normally allotted to each division, but actually the divisions took the field with no more than three or four.

A field hospital is equipped for 200 sick and is divisible into two halves. Its staff consists of six medical officers (one principal medical officer), one apothecary, one quartermaster, 108 men of the medical and transport corps, with thirty-eight pack horses, or a corresponding number of transport waggons.

The medical equipment comprises twelve panniers; the other equipment (cooking utensils, camp gear, four tents, clothing, &c.) is packed in receptacles or carried loose on the horses or in the carts.

Three other units are also allotted to the division, viz., a "medical transport *personnel*," a "medical reserve *personnel*," and a "medical material *personnel*." The first deals with the transport of convoys of wounded, proceeding from the field hospitals to the étappen line, but its main function appears to be the erection of temporary shelters for the sick and wounded; the second provides the stationary field hospitals; and the third corresponds apparently to our advanced medical depôt.

In action, the regulations lay down that half the regimental medical *personnel* will afford first aid as near the fighting line as possible; while the other half, more to the rear, in sheltered places—"the regimental aid stations"—prepare the wounded brought to them for further transport.

As soon as the divisional medical detachment comes up, a dressing station is formed in a suitable place, and the bearer companies proceed to the regimental collecting stations for the wounded, and when necessary to the fighting line, searching in open formation the whole line of advance. On the formation of the dressing station the regimental bearers rejoin their units.

The dressing station is divided into three groups marked by different coloured flags: (1) a reception and sorting group (blue flag); (2) an operation group (white flag); and (3) a dressing group (red flag). Antiseptic wound treatment is prescribed at the collecting and dressing stations; but in the field hospitals and subsequently, asepsis is to be aimed at.

From the report of an eye witness it is gathered that medical aid was carried out in practice in the manner above stated, so that even under fire with modern arms first aid is possible.

Chinese were also requisitioned to act as carriers of the wounded; and when the number of regulation stretchers proved insufficient, improvised stretchers, usually made of straw mats fastened between two saplings, were used.

Female helpers were also employed on the battlefield, a position which their training in the national "Bushido" enables them to fill with effect.

The attention devoted to sanitation in the field by the Japanese deserves notice, as the most complete and worthy of imitation hitherto practised. A thorough grounding in the principles of hygiene is given to officers and men of the combatant branches; while the exact execution of hygienic measures is guaranteed by the strict discipline and love of cleanliness of the Japanese soldiers.

"The military surgeon is everywhere," says Major Seaman, of the American Army Medical Service. He follows with his assistants and microscope the most advanced reconnoitring parties, searches the locality for infectious diseases, tests the drinking water, and causes every hygienic measure for the safety of the troops to be carried out. Even blood examinatious are undertaken to determine the presence of malaria among the inhabitants of the country.

A medical officer trained in bacteriology and provided with a suitable equipment is attached to every division. In camps more or less permanent, sanitary commissions are formed, which, aided by sanitary police, exercise strict supervision over all health conditions.

It is well known that long before the outbreak of the war, its future scene—Manchuria—was carefully explored by the Japanese, not only from a military and economical aspect, but also as regards sanitation. In this way they succeeded in reducing to a minimum the usual epidemics of campaigns, a performance which other nations in recent wars have failed to accomplish.

Steiner then gives an account of the Japanese soldiers' clothing, kit and equipment, drawn from Miss McCaul's book on the subject.

The rations consist chiefly of rice, about a litre a day, with preserved meat, fish and vegetables. The rice is prepared in the evening, and one-third eaten at once, the remainder being reserved for next morning and the subsequent long halt. To the poorness of the ration in nitrogen was attributed the prevalence of beri-beri, and therefore a barley bread was substituted for the rice twice a week, and more meat added. It has, however, been pointed out that the disease has not decreased subsequent to this change.

The preserved vegetables contain cooked potatoes in slices, carrots, sliced pumpkin aud beans. Tea and salt are issued in tablets and cubes. The biscuit is made of wheat, rice and a little millet, which is supposed

to keep it from getting hard. At the canteens the soldier procures *sake*, beer, tobacco, cigarettes, and a very favourite sweet biscuit.

Each man cooks his own rations. Only in the Artillery are two large iron cooking pots per battery in use. Where the Japanese have captured the excellent mobile field kitchens of the Russians they have preferred to use them for the boiling of drinking water, otherwise each man has to boil his own drinking water in his copper kettle.

It should also be mentioned that each soldier receives a tin-foil box containing ninety creosote pills, of which he is directed to take two daily as a prophylactic against dysentery.

In the housing of the troops in the field hygienic requirements are followed as far as possible. The men are most frequently quartered in Chinese houses, previously medically inspected and, if necessary, cleansed. In these a piece of the brick bed-oven—the so-called *kangs*—two metres in length, is allotted to each man, on which straw mats or quilts form a comfortable couch. In camps of any duration baths are arranged, by sinking in the ground large Chinese pots in which a man can sit comfortably. The latrines are the object of the most anxious attention. Specially insalubrious villages or those with any considerable number of infections cases are not occupied; the troops have then to pitch camp.

The shelters of the troops at the outposts, where they have had to face for weeks the rigours of the northern winter, with an average day temperature of 30° to 36° C., below zero, are earthen huts made in every available crevice and water-course, or consisting, where these are not available, of holes dug in the ground and roofed with beams, straw mats, reeds, &c., the doors being hung with tent flaps and the floors covered with straw. They are made for two or three men or for whole squads, and are heated by wood charcoal, burned on old tin provision boxes, or Russian cartridge cases, certainly a dangerous method. Where practicable, *kangs* are improvised by the erection of two low walls, overlaid with flat stones, jointed with lime, a fire being kept up at one end, and the smoke issuing at the other. The stone surface thus heated forms the sleeping place.

In May, 1904, an order was issued providing for the collection and disposal of the killed and wounded and of articles of equipment by parties detailed by each tactical unit after an action. The Russian dead were to be buried, the Japanese burned, identity being in both cases first established, as far as possible. The personal property of both nationalities was to be sent to Japan, in the former case to be disposed of by the bureau for prisoners of war at Tokio, and in the latter to be transmitted to the man's relatives. Accompanying the latter there was to be a fragment of the dead man's larynx, or of a bone and a lock of hair for burial with befitting honours in his native burial ground. The graves were directed to be at least one metre in depth, and not more than 50 bodies placed in one; over the bodies was to be spread a layer of lime, charcoal, ashes or slack. Dead animals were to be burnt or buried, according to circumstances.

In reality, the foregoing directions were often not carried out for want of time and fuel. For instance, after the murderous combats in front of Shusampo, the bodies filled up the trenches, and were simply covered over with earth from the breast-works. The diseases which the Japanese had

to expect, judging from their experience in 1894 and 1900-01, were enteric fever, dysentery, malaria, cholera, but above all, beri-beri.

The following fairly reliable report on the II. Army (Lieutenant-General Oku), embracing the period from the end of April to the middle of November, 1904, is of interest in this respect. Of a strength of approximately 60,000 men, 24,642 sick received medical treatment. Of these, 18,578 recovered, and only 40 died, the remainder being sent to Japan. Among the sick 193 suffered from enteric fever, 342 from dysentery, 5,070 from beri-beri. During the same period the loss from the enemy's arms was 5,127 killed and 21,180 wounded.

It thus appears that the Japanese practically succeeded in preventing the outbreak of epidemics of enteric fever and dysentery. The chief factor in the prevalence of beri-beri—the so-called scourge of Japanese armies—is attributed to the great susceptibility of the Mongolian race, the disease not having been reported as occurring among the Russians, although they were under the same climatic conditions. It is noteworthy that in the fleet the Japanese have succeeded in considerably reducing the number of cases of beri-beri, an effect which is attributed to the introduction of a ration rich in nitrogen. The relatively infrequent occurrence of diseases on the gastro-intestinal tract is striking, and is evidently due to the easily digestible food and the regular and temperate habits of the Japanese soldier.

Although epidemics have not hitherto appeared to any considerable extent, a quarantine station, as in the war with China in 1894-95, is stated to have been established in the neighbourhood of Hiro-shima for all persons coming from the seat of war. Before the great cold set in instructions were issued regarding the hygienic conditions in winter, the means of protection against frost-bite, and the rendering of first aid in such cases. Each soldier was served with an ointment, the composition of which has not been ascertained, to apply to parts of the body exposed to the extreme cold.

Thus we see, on the Japanese side, everywhere a care, extending to the smallest detail, for the health of individuals, thereby securing the efficiency of the Army as a fighting machine.

G. Coutts.

The Recent Work of Koch in East Africa.—In the *Deutsche Med. Woch.* for November 23rd, 1905, Koch gives a preliminary account of his researches in East Africa. In regard to the tsetse fly and trypanosoma work, he confirms the investigations of the Sleeping Sickness Commission in Uganda. It may be pointed out here that the facts which he brings out in his examination of infected tsetse flies, *e.g.*, the enormous multiplication of the trypanosomes in the alimentary canal of a certain percentage of flies, and the alteration in the morphology of the trypanosomes, had already been discovered by workers (Gray and Tulloch) of the Sleeping Sickness Commission, aud published in Report VI. In his final report Koch will doubtless refer to these important observations.

The following is a summary of his results :—

(1) *Recurrent Fever.*—He found the spirochæte to be present in very small numbers in the peripheral blood of these cases. This was also observed by the Sleeping Sickness Commission in Uganda. He states

that the spirochæte is transferred from the sick to the healthy by a tick, *Ornithodorus moubata.* This was previously discovered by Dutton and Todd in West Africa. He finds the spirochætes in the eggs of these ticks, at first in very small numbers, later very numerous. He observed no life cycle in the spirochæte. He found 5—15 per cent. of the ticks examined showed the presence of spirilla; in some cases as many as 50 per cent.; three oxen showed the *Spirillum theileri* in their blood.

(2) *Development of Piroplasma bigeminum.*—Koch states that he has discovered copulation forms. At each end of these bodies radiating star-like processes of protoplasm are figured. He considers that, probably, these are stages towards the development of the large bodies, which he observed in the eggs of infected ticks. He noted the development of *Piroplasma bigeminum* in *Rhipicephalus australis*, *Rhipicephalus evertsi* and in *Hyalomma ægyptium.*

(3) *Coast Fever of Cattle.*—He has described the first stage of the development in ticks. It is similar to that of *Piroplasma bigeminum.* He has only seen it in the adult tick (*Rhipicephalus australis*). These forms were never observed in the young tick; this he believes points to the parasite being introduced by the young of the tick, in which they pass through their final stage of development.

(4) *Tsetse Flies and Trypanosomes.*—He found four kinds of tsetse fly on his journey: *Glossina fusca, morsitans, pallidipes* and *tachinoides.* He examined a number of specimens of *Gl. fusca*, and found in the stomach of some, even when there was no blood, an enormous number of trypanosomes. He interprets certain forms of trypanosomes, which he finds in the stomach of the fly, as being sexual forms. The female is thick, plump, rich in blue protoplasm, and having a fairly large round nucleus: the male is long, thin, with no blue protoplasm, but a long compact nucleus. He has not yet discovered copulation forms nor microgametes. In the lower part of the stomach he sees larger forms with 2-8 nuclei. He speculates that these break up into the youngest forms, which can be traced in all stages, from round bodies having a single nucleus up to those having a micro- and macro- nucleus, the former being placed anterior to the latter. He noted other forms which have the appearance of having split off from a larger body. From the above description it will be seen that Koch's observations are very similar to those made by Gray and Tulloch in their examination of infected flies. The interpretation which Koch puts on the forms will require further confirmation.

Koch considers that a fly can only become infected and retain the infection for any length of time when it has fed on an animal which has been infected with trypanosomes for some time; when it feeds on an animal recently infected, the trypanosomes are digested by the fly and no multiplication occurs. He considers that the trypanosomes must be in a certain stage of their development, before they are infective to the fly. He considers they are in this stage in the wild game. In Langeralet he found 17·4 per cent. of the flies examined were infected; there were a number of goats and sheep there, which were found to have trypanosomes in their blood, although apparently healthy.

He thinks the slow reproduction of the *Glossina* may offer a weak point against which measures for the prevention of the spread of the

disease may be directed. This idea was suggested by Bruce and Greig some months ago in a Memorandum to the Colonial Office in relation to the prevention of the spread of the disease in Africa.

In connection with Koch's work the report of Professor Minchin, who has been specially investigating the changes of the trypanosoma in the tsetse in Uganda, will be looked forward to with much interest.

E. D. W. Greig.

Correspondence.

THE POSSIBLE INFECTION OF MAN WITH *MICROCOCCUS MELITENSIS* BY GOATS' MILK.

TO THE EDITOR OF THE "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

DEAR BRUCE,—I have just seen Dr. Gotschlich, who told me of a ship starting from Malta with a certain number of milch goats for London. The captain, officers, and a certain number of the crew drank the milk and nearly all those that did so contracted Malta fever, whereas the others did not. I have urged Dr. Gotschlich to publish particulars at once.

Conseil Sanitaire,
Maritime et Quarantenaire D'Egypt,
November 8th, 1905.

Yours sincerely,
N. ARMAND RUFFER.

The following letters from Captain J. C. Kennedy, R.A.M.C., and Dr. E. Gotschlich, on the same subject, have been received since the receipt of the above information from Dr. N. Armand Ruffer:—

TO THE EDITOR OF THE "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

DEAR COLONEL BRUCE,—I came across a very interesting thing in connection with the infection of Mediterranean fever by means of goats' milk. I got to hear from Dr. Stilon, who is writing for fuller particulars, of a ship trading between Antwerp and Egypt, which called in here the other evening, and the captain of which and another man came ashore to consult Dr. Stilon, who found them suffering from symptoms of Mediterranean fever. He took samples of their blood, which he sent to the laboratory. Dr. Micallef did the reactions, and I only saw them after he had put them up, when there was an undoubted reaction. He had no more blood for me to test.

These two men left Malta on board their ship early next morning, and I did not hear of the case for twenty-four hours after, but particulars of which, as far as I can gather from Dr. Stilon, are as follows:—

Two months ago the s.s. "Joshua Nicholson" called at Malta and shipped some goats for Antwerp. On the way the crew drank the goats' milk unboiled, with the exception of one man (a carpenter or engineer), who refused it. At Antwerp they left the goats and shipped on a new crew, with the exception of the captain, the mate, the above-mentioned carpenter or engineer, and two other men. After leaving Antwerp, one of these five men went sick and had to be landed at Gibraltar; another was very ill at Alexandria, and his blood was sent ashore to be tested, and was said to react to the *Micrococcus melitensis*. They then proceeded

to Odessa, where others fell sick, and by the time they had come back to Malta all of the five men were sick with the exception of the one man who refused to drink the goats' milk.

I have written to Major Horrocks, at Gibraltar, asking him to try to trace the man who landed there, and Dr. Stilon is writing to Antwerp to get more particulars, which I have asked him for. It is most unlikely that the infection was contracted in any other way, as they merely stayed here a few hours, and did not, I suppose, even land.

Valletta, Malta, Yours sincerely,
December 14*th*, 1905. J. Crawford Kennedy.

TO THE EDITOR OF THE "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

Dear Sir,—At your request I send a report of a small epidemic of Malta fever, which occurred on board the s.s. "Joshua Nicholson" (Ellerman line). On October 21st last, Frederick Yenkins, aged 33, steward of the s.s. "Joshua Nicholson," which was anchored in our port, was admitted into the Deaconesses' Hospital of our city with the clinical signs of Malta fever. At the request of Dr. Morrison, physician of the said hospital, I made a bacteriological examination of the blood of this patient (Widal's reaction), with the following result: positive agglutination with *Micrococcus melitensis* in a dilution of 1 in 1,200; control with *Bacillus typhosus abdominalis* negative in a dilution of 1 in 50. The result of the bacteriological examination thus corroborates the diagnosis of Malta fever. The patient left hospital, cured, on the 4th instant.

Dr. Morrison had the kindness to draw my attention to the history of the case, which is very interesting from the point of view of the relation between the infection by the *M. melitensis* in man and in the goat. Based on these communications on the part of Dr. Morrison, and on the information which I have been able to collect from the patient himself, the history of infection in this case is as follows:—

The s.s. "Joshua Nicholson" had, on the occasion of its previous voyage, starting from Odessa, anchored about August 19th last for about one day in the port of Malta to take on board a flock of sixy-five goats, destined for the United States of North America. Seeing that the stay of the ship at Malta had only been of so short duration, and seeing that (as I am assured) no one left the ship to go ashore, it is extremely improbable that the cases of Mediterranean fever, which appeared later amongst the crew of this vessel, could have been contracted during the stay at Malta by direct or indirect contagion. The ship then continued her course from Malta to Antwerp, where she arrived about September 5th last. During the whole voyage every one on board (to the total of twenty-four) had drunk fresh milk from the goats embarked at Malta These latter were transhipped two or three days after arrival at Antwerp

to a ship leaving for a port in North America, of which, unfortunately, I have not been able to learn either the name or the exact locality.

The s.s. "Joshua Nicholson" remained at Antwerp for about two weeks, proceeding next to London. It was during the last days of the stay at Antwerp, or during the voyage to London (I have not been able to obtain exact information on the subject of these dates), that four people on board fell sick with the fever, whilst during the whole of the voyage from Malta to Antwerp, and during the greater part of the stay in the latter port, every one had been in perfect health. The sick were—the captain (slightly attacked), the first officer, the chief engineer, and the steward. As to the last, I have been able to prove, since his arrival here, that he suffered from a typical attack of Malta fever; as to the three others, it has been impossible for me to obtain a bacteriological examination of their blood, but I have been assured that their clinical symptoms were absolutely identical with those observed in the steward. In all probability Malta fever was present in all the four cases. In addition, there is a fifth case, a certain Swartier (?), treated in the Dreadnought Hospital at Greenwich, London, but I have not been able to learn what may have been the symptoms of his sickness. Perhaps it would be possible to obtain information with regard to him from the authorities of the above hospital. It would, indeed, be particularly interesting to know if this fifth individual also had Mediterranean fever, for that would prove that the case existed, not exclusively in the officers' quarters (captain, first officer, and where the steward principally carried out his duties), but also among the crew.

To sum up, we find ourselves in the presence of a small epidemic of Mediterranean fever on board a ship which had embarked a flock of goats at Malta, and amongst persons who had drunk unboiled milk from these goats. Now, as according to the researches of the Commission of the Royal Society for the investigation of Malta fever, the goats of Malta are very frequently infected by this malady, and as it is proved directly that the *M. melitensis* is secreted often in enormous quantities in the milk of these goats, there would be nothing surprising in finding that people who has drunk such milk had contracted this infection; besides, this will be the first time that this mode of infection in man by the milk of the goat will be directly demonstrated. This hypothesis would have more in its support if one could prove that the above-mentioned Swartier, one of the crew, had been likewise attacked by Malta fever. But if that is not the case, we ought not to disguise from ourselves that there may be yet another possible way of explaining the infection in this little epidemic; it is, that all the four people attacked were in the officers' quarter, and were there daily in contact with a passenger, an American, who had been several months in Malta buying the flock of goats, and who accompanied the latter to its destination. Unfortunately, I have not been able to get the name of this gentleman. As to his state of health,

the steward assured me that he was apparently always very well; nevertheless, this does not exclude the possibility that this gentleman may have contracted Mediterranean fever during his long stay in Malta, and that he may have retained and propagated the infection in the latent state, *e.g.*, by the urine, following the analogy of certain convalescents from typhoid fever who, while being apparently in perfect health, can for several months propagate the infection. Perhaps it may be possible to clear up this question by later investigations on the subject of this passenger.

As regards the goats, which, according to what I have heard, were destined for establishments for supplying milk to children in America, I have drawn the attention of the Consul of the United States in our city to the danger likely to ensue under this head.

Up to the present I have not been able to get further information as to what has become of these goats.

Pray accept, Mr. Editor, the assurance of my esteem,

Alexandria, E. Gotschlich, *Director of Sanitary Services*,
December 8th, 1905. *Municipal of Alexandria.*

[Note.—When in Rhodesia last September, Sir Charles Metcalfe informed us that Malta goats had been imported into Rhodesia, and with them Malta fever.—Editor.]

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Original Communications.

REPORT ON THE METHODS EMPLOYED IN THE CAMPAIGN AGAINST TYPHOID FEVER IN GERMANY.

By CAPTAIN E. D. W. GREIG.[1]
Indian Medical Service.

(1) *Introduction.*—In order to study the various methods employed in the campaign against typhoid fever in Germany, permission was obtained, through the Foreign Office, for me to go to Germany and investigate the subject there. I reached Berlin on September 25th, 1905, and was advised to study the methods, in the first instance, at the Kgl. Institut für Infectionskrankheiten. This I did until October 22nd, 1905, on which date I proceeded to certain of the Institutes for antityphoid work to study the practical application of the methods. I visited the Institutes at the following places: Saarbrücken, Neunkirchen, Metz, Diedenhofen and Trier. At these places I studied the routine method of examination of the material sent in, and accompanied the Superintendent on several occasions into the district to see the methods adopted in investigating outbreaks of typhoid fever in the villages. I was thus enabled to gain an insight into the practical working of antityphoid measures in Germany.

I desire to express my heartiest thanks to Professor Dr.

[1] Deputed by the Secretary of State for India to investigate this subject in Germany.

Kirchner, Geh. Ober. Med. und vortragender Rat. in Ministerium d. Geistl. Unterrichts u Med. Angelegenheiten, for his advice and help, to Geh. Med. Rat. Professor Dr. Gaffky, Director of the Kgl. Institut für Infectionskrankheiten, and to Professor Dr. P. Frosch, with whom I worked at the Institut, for his constant courtesy, and to the Superintendents of the Institutes at Saarbrücken, Neunkirchen, Metz, Diedenhofen and Trier, for affording me every facility for investigation.

(2) *Facts of Importance in Connection with Antityphoid Measures:* (*a*) That typhoid fever is spread to a large extent by the bacilli being directly carried from the sick to the healthy, *e.g.*, infection of food, the use of contaminated eating and drinking utensils, &c. In this form of so-called "contact" infection the epidemic has a gradual onset and prolonged course. Should the bacilli gain access to a water supply used by a number of persons, then a large number of cases occur simultaneously—the so-called "explosion epidemic." The workers in Germany have found this latter mode of infection of comparatively rare occurrence as compared with the former.

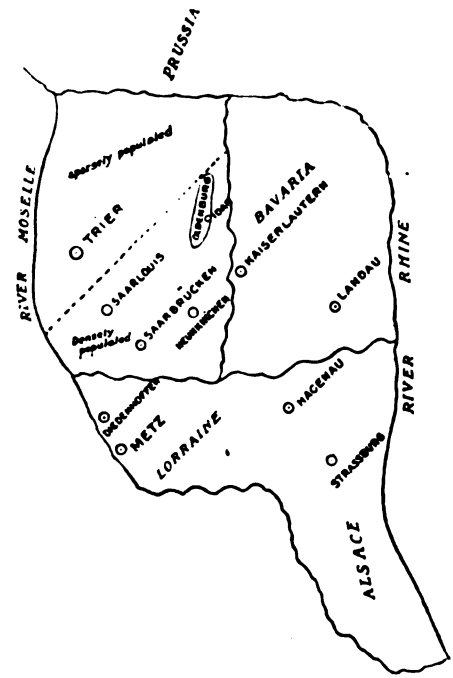
(*b*) *That living bacilli may continue in the fæces and urine for long periods after the fever has ceased, and that persons who give no history of previous attacks of typhoid fever, but who have been in contact with typhoid cases, may also harbour the bacilli in their stools.* This group of cases is a very important one from the prophylactic point of view; they are the "bacilli carriers" of the Germans. These individuals are, in fact, "reservoirs" of the parasite and play an analogous part to the wild game in Nagana, which harbour the trypanosomes without any apparent signs of disease.

(*c*) That the disease may run a very mild course, particularly in young children, and thus a number of cases may escape observation. The detection of these cases forms a very important part of the antityphoid work.

(*d*) That a disease, closely resembling typhoid fever, clinically, but caused by a totally distinct organism—*B. paratyphosus, B.*—may occur at the same time as typhoid fever.

(3) *It is Necessary to Organise Scientific Institutes near the Typhoid Epidemic to put into Practice the above Principles.*—The German Government has founded eleven Institutes, each with a Superintendent and two or three trained scientific medical men, as well as one or two attendants, for the antityphoid campaign in Alsace-Lorraine (*vide* sketch map). These Institutes are fully

equipped for the scientific work required. They are chiefly engaged in the prevention of the spread of typhoid amongst the civil population. The military population, which is a large one, has a similar organisation, and the conditions being much more favourable for carrying out the antityphoid measures, the results show a satisfactory reduction of typhoid fever amongst the troops.



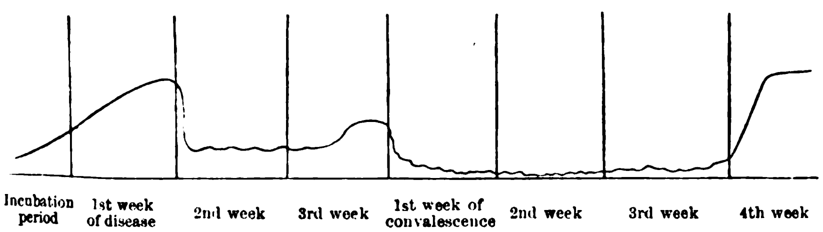
SKETCH MAP OF DISTRICT WHERE ANTI-TYPHOID CAMPAIGN IS BEING CARRIED ON.
Circles show the position of the eleven institutes for anti-typhoid work.

Each Institute has its defined area of work, but they also keep in touch with one another. The extent of the area of work is determined by the density of population, *e.g.*, Trier, which is situated in a sparsely populated district, has a very extensive area, whilst those of Saarlouis, Saarbrücken and Neunkirchen are small, the population being very dense near these places. The Institute receives its material from the various medical men in charge of the cases, and the members go out into the villages and towns with the District Medical Officer of Health and investigate the details of the origin of the epidemic. As far as possible, each epidemic is

traced back to its source. It is necessary to determine: (1) Whether cases are imported ones; (2) whether the infection is carried by water; (3) whether carried by food; (4) whether carried by men affected by typhoid fever, *e.g.*, family epidemic; (5) whether a local focus of endemic typhoid, so-called "typhoid-house," exists. In carrying into practice these lines of investigation, certain lists, kept in every village, are examined in the first instance; these are: (*a*) list kept by police of reported arrivals in the village; (*b*) the list of attendance at the schools; (*c*) the sick list (*krankenkassenlisten*); (*d*) the list of deaths reported. From these lists valuable information is obtained, which forms a starting point for further investigation. It is generally found that the actual number of cases of typhoid fever far exceeds that which has been reported. The water supply, milk supply and general sanitary condition of the village are carefully enquired into, and the result of these, along with the result of the bacteriological investigations, is entered in a special form, which is called *Fragebogen*, which contains thirty-nine headings, which are classified under (1) *General, i.e.*, position and character of place, water and milk supply, &c.; (2) *special*, which contains details regarding patient, the disinfection carried out, and the result of the bacteriological investigations; (3) *result of the case*, whether it ended in death or recovery; the results of final bacteriological investigation, and what sanitary improvements have been carried out.

The suspected cases having been picked out by the help of the information obtained from the above-mentioned sources, it is next necessary to examine the blood, fæces and urine of each at the laboratory. The blood is taken in capillary tubes. For the urine and fæces special glass tubes, fitted with a metal spoon in the cork and carefully enclosed in a tin and wooden box, are left at the house. Directions are given to the nurse or friends to place three or four spoonfuls of the fæces in one tube, which is packed, and the box carefully labelled; some urine is also placed in another tube. These are forthwith despatched to the institute. It is important for the investigation that they should be as fresh as possible. When these are received in the laboratory they are examined at once. The result of the examination is communicated to the medical man in charge of the case and the Medical Officer of Health, who have the necessary disinfection and isolation carried out. When possible the isolation is carried out in special hospitals; otherwise the Medical Officer of Health gives the necessary instructions to the friends for the isolation of the patient in the house. For the purposes of

disinfection the Liquor Creosoti Saponatus of the German pharmacopœia is used. The eating and drinking utensils are immersed in it. The stools and urine, which are received in special vessels, are mixed with it. After the patient is entirely free from fever the stools and urine are examined three times at intervals of ten days, and the patients are not allowed to leave the hospital until the result of the bacteriological investigation shows them to be free from bacilli. It is found necessary to do so three times, as relapses are not infrequent, especially in the fourth week of convalescence (*see* chart), in which case the examinations have to begin afresh.



CURVE OF EXCRETION OF *Bacillus typhosus* IN FÆCES IN CASE OF TYPHOID FEVER. Shows relapse in fourth week of convalescence.

Having thus considered the general plan of work, it is necessary to consider:—

(4) *Technique Employed for the Examination of Material Received from Suspected Cases of Typhoid Fever.*—As a matter of practical routine the following examinations are made:—

(1) *Blood.*—The usual Widal reaction, carried out both microscopically and macroscopically. The test is made both with typhoid and paratyphoid B. bacilli. It may be observed that a positive Widal reaction is no proof that the present illness of the patient is typhoid fever, but a reaction which is at first negative and then becomes positive, is absolute proof.

(2) *Fæces and Urine.*—The examination of these for the presence of *B. typhosus* and *paratyphosus* is all important. Unfortunately we have not yet discovered an ideal method for the detection of *B. typhosus* in fæces; its recovery from the urine is a simpler matter. We have not got an "enriching" process similar to the peptone water for the detection of the vibrio of cholera. The newer methods, however, are a distinct advance on our older methods, and no doubt further advances will be made.

The following are the methods used: v. Drigalski and Conradi

[1]. Malachite green method of Lentz [2]. Fuchsin agar method of Endo [3]. Caffeïne-fuchsin agar method of Gaehtgens [4].

In the institutes visited either the Drigalski-Conradi method alone was employed, or in combination with the malachite green method. The Endo method was employed in Diedenhofen, as well as the others. Each method has its advantages and disadvantages, but it is quite certain that rapidity in detecting the typhoid colonies is largely a matter of experience and practise, and an observer who is accustomed to recognise it on one medium may fail to do so on another. The details of the mode of preparation of each of these are given.

(*a*) *Drigalski-Conradi. Preparation of Medium.*—(i.) *Agar Preparation :* To 3 lbs. of finely-cut horse flesh add two litres of water. Allow it to stand till next day. The expressed meat juice is boiled for one hour and filtered. Add 20·0 gr. peptone sicca, Witte, 20·0 gr. nutrose, 10·0 gr. NaCl, boil one hour; now add 70 gr. bar agar, then boil three hours (or one hour in autoclave), render slightly alkaline (indicator litmus paper). Filter, boil half an hour. (ii.) *Litmus Solution:* Litmus solution (Kubel and Tieman) 260·0 ccm., boil for ten minutes, add milk sugar (chemically pure) 30·0 grm. Boil fifteen minutes. (iii.) Add the hot litmus-milk-sugar solution to the liquid agar solution cooled to 60° C. Shake well. Render it again faintly alkaline. The colour of the froth is a good indicator. Add then 2·0 ccm. of a hot sterile solution of 10 per cent. water-free soda, further add 20 ccm. of a freshly-prepared solution of 0·1 gr. crystal violet B. (Höchst) in 100·0 ccm. warm water (distilled).

One has now a meat-water peptone-nutrose agar with 13 per cent. litmus and 0·01 per mille crystal violet. This can be poured directly into plates and the remainder kept in 200 ccm. flasks.

(*b*) *The Malachite Green "Enriching" Method of Lentz. Preparation of the Medium.*—The proper preparation to use is malachitgrün (crystal) (Höchst) dilution 1-22,000. Preparation: Three pounds fat-free flesh (oxen), finely divided, macerated with two litres of water for sixteen hours. The extract is expressed, boiled for half an hour, filtered, then 3 per cent. agar added and boiled for three hours; add to the agar 1 per cent. peptone, 0·5 NaCl, and 1 per cent. nutrose (this may be omitted). This is brought to the litmus neutral point by soda solution with duplitest paper. Boiled one hour, filtered through linen. The reaction of the finished agar is sometimes distinctly acid. It is filtered into small flasks of 100-200 ccm.

Before the addition of the malachite green, the hot agar is tested by duplitest paper and so far alkalised with sterile soda solution until the red strip is distinctly red-violet. This reaction point corresponds in agar, without nutrose, to an alkalescent degree of 1·8 per cent. normal soda below the phenolphthalein-neutral point; if the agar contains nutrose, which remains neutral towards litmus and bacteria, then the alkaline reaction corresponds to 3·5 per cent. normal soda solution below the phenolphthalein point.

To 100 ccm. of the hot agar 1 ccm. of a 1-220 solution malachite green (the solution keeps good for ten days) is added, *i.e.*, agar contains 1-22,000. By this concentration of malachite green (crystal) the growth of the usual kinds of *B. coli*, as well as many alkali-forming organisms, is greatly diminished and practically prevented. The *B. typhosus* growth is also diminished, but only so far that after twenty-four hours the colony can be recognised with the naked eye, the size of a particle of sand, whilst, after a longer period in the incubator, in two to four days, larger, stronger colonies appear which colour the agar yellow.

The finished agar is poured at once into Petri dishes in 2 mm. thick layers. The dishes are well dried.

(*c*) *The Fuchsin Agar method of Endo. Preparation of the Medium.*—In an enamel pot put two litres of water (tap), 20·0 gr. Liebig's meat extract, 20 gr. peptone sicca, Witte, 10·0 NaCl, and 80 gr. bar agar. Boil, filter, neutralise. Add 10 gr. *chemically pure* milk sugar and 10 ccm. of 10 per cent. crystallised fuchsin in 96 per cent. alcohol. Then the medium becomes dark red in colour. Now add 25 ccm. of a 10 per cent. sodium sulphite solution. The medium becomes gradually discoloured, but only completely so when the agar is stiff. Sterilise in small tubes for thirty minutes. Pour into plates.

(*d*) *The Caffeïne-Fuchsin Agar method of Gaehtgens. Preparation of the Medium.*—As a result of his experiments, he found that an addition of 0·33 per cent. chemically pure caffeïne to Endo's medium (*vide* previous preparation), which had an alkalinity equal to 1·5 per cent. normal KOH below the neutral point of phenolphthalein, markedly increased the value of the medium as a means of detecting *B. typhosus* in the stool.

Endo medium, prepared in exactly the same way as described by himself, is liquefied, made alkaline to the required degree, and the required amount of caffeïne added.

In all these methods attempts are made, with more or less success, to check the growth of members of the coli group, and to

encourage the development of the *B. typhosus* and *paratyphosus*. In the Drigalski and Conradi method, crystal violet is used; in the Lentz method, malachite green; in the Endo, fuchsin; and Gaehtgens, caffeïne. At the same time, the typhoid colonies are differentiated from the coli group by a colour reaction. In Drigalski the typhoid colonies are blue and the coli red. In the Endo the coli colonies turn bright red, whilst the typhoid colonies are colourless. In both cases the fact that *B. coli* produces acid in presence of milk sugar is made use of by, in the one case, litmus, and the other, decolourised fuchsin, a colour reaction being thus obtained in both cases.

Malachite green checks the growth of both coli and typhoid very markedly, but more especially coli. Accordingly, when a stool is planted out on such an agar plate, it may not be possible at the end of twenty-four hours to detect any colonies of typhoid. Lentz has found, however, that if such a plate is flooded with normal salt solution and gently rocked and then allowed to stand for a few minutes, the delicate typhoid colonies diffuse themselves in the solution, whilst the solid coli colonies sink to the bottom, so that if a little of this fluid is plated out on Drigalski plates, practically a pure growth of *B. typhosus* or *paratyphosus* may be obtained. In practice it is found that the *B. paratyphosus* is readily "enriched" in this way, but the *B. typhosus* not to the same extent.

Having thus seen the method of preparation of the different culture media and principles of their use, it is next necessary to consider the method of preparation and insemination of the plates with the fæces and urine. The following are the steps:—

(1) *The Preparation of the Plates.*—In this investigation it is more convenient to use a larger size of Petri dish than that generally used. It should be from 15 to 20 centimetres in diameter. About 20 to 25 cubic centimetres of the medium is poured into each plate. The plates are allowed to remain open until all the steam has evaporated and the agar is quite stiff. It is essential that the surface of the plates should be quite dry and firm. Contamination by air-organisms does not occur on account of the aniline dye present in the culture media.

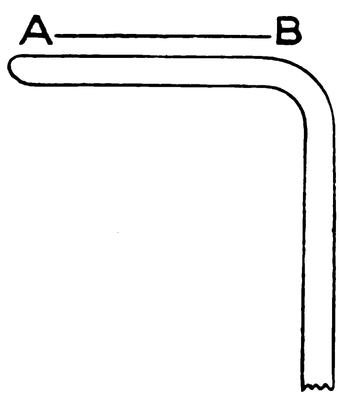
(2) *The Preparation of the Fæces.*—The fæces are thoroughly mixed with a small quantity of sterile normal salt solution. Then, when one malachite green plate is used in combination with two Drigalski plates, about 0·5 ccm. of the mixture is placed on a green plate. This amount may also be used with the caffeïne-Endo, but

with the Drigalski plates alone a much smaller amount, about one or two loopfuls, is sufficient.

In the case of urine, several drops are placed on the green plates; on the Drigalski plates one drop is sufficient.

Having thus got the prepared material on the first plate, the next step is the smearing. This is done in the same way, whether green and blue or all blue plates are used.

(3) *Smearing of the Plates.*—A sterile glass rod, bent at right angles shaped thus is used—



A—**B** = Portion used to smear the plates.

The material on the first plate is thoroughly smeared by rubbing the glass spatula, as it is called, in all directions over the surface of the agar. Then, without sterilising it, the same spatula is rubbed over the surface of a second plate, and then over a third and fourth. After the smearing the plates are allowed to stand open till quite dry. The plates are then placed in the incubator at 37° C., and left there for twenty to twenty-four hours. At the end of this period the next step is:—

The Examination of the Colonies.—It will be convenient to state briefly the characters of the colonies on the different media already mentioned.

(1) *Drigalski-Conradi.*—By this method the first plate is so overgrown that it is useless for further examination. The second, third and fourth, however, are carefully inspected. It is very desirable to use a hand lens for this purpose. Also to direct the plate so that the light falls from a wall, not directly from the window, as a better contrast between the colonies is obtained. After a good

deal of practice it is possible to recognise immediately a colony of *B. typhosus* on the plate even if only a single one exists, but, at first, it takes a considerable amount of time, because a large number of colonies are found which closely resemble those of *B. typhosus*, and it is therefore necessary to test each of them according to the methods described later. Broadly stated, the *B. coli* colonies are more or less red in colour, not transparent, and from 2 to 6 mm. in diameter, whilst the *B. typhosus* colonies have a diameter of from 1 to 3 mm. The colour is blue with a dash of violet; they resemble dew drops.

(2) *Combined Malachite Green and Drigalski Method.*—As will be remembered, the first plate in this method was malachite green agar, and the second and third Drigalski-Conradi. At the end of twenty hours the second and third plates are examined, and present the same characters as noted above. If typhoid colonies are found on these plates then the investigation is finished, but, if they are not, it is possible by a further procedure to detect them, and this is the special merit claimed for this method. The procedure is this: the green plate is flooded with sterile normal saline and gently rocked, and then allowed to stand for a few minutes. By this means it is found that the more delicate typhoid and paratyphoid colonies readily diffuse themselves in the liquid, whilst the heavier coli colonies, whose growth has been remarkably inhibited by the malachite green, sink to the bottom. The glass spatula is then dipped in the salt solution and rubbed on one or two Drigalski-Conradi plates, which are placed in the incubator at 37° C. for twenty hours, and are then examined in the usual manner. This method of "enriching" gives very good results with *B. paratyphosus*; the *B. typhosus* is not "enriched" to the same extent, but still it is an additional means of detecting this organism, and in the hands of Lentz has yielded good results.

(3) *Endo Method.*—Here all the coli colonies are bright red at the end of twenty hours, and, therefore, very easily separated. The typhoid colonies are colourless and very transparent. A stool plated on this medium gives a very striking picture, and the use of this method does not strain the eyes to the same extent as the blue plates. If a very large number of coli organisms are present the plate is liable to become entirely red, and this interferes with the examination of the typhoid colonies. On the whole, this medium appears a very useful one for the separation of *B. coli* and *typhosus.*

(4) *Gaehtgens Caffeïne-Fuschin Agar.*—The appearance is essentially the same as that on the Endo plates, but the growth of *B. coli* is markedly inhibited.

Having thus seen the general appearance of the colonies, the next step is :—

The Identification of Suspected Typhoid Colonies.—In practice, this is done as follows : (1) A portion of the colony is touched with a very fine platinum needle and placed in a drop of highly active serum, in dilution 1—100, on a slide and carefully mixed ; at the same time a control should be made with a drop of normal saline solution placed alongside. The agglutination, if it occurs, may be observed with a hand lens or low power of the microscope. Both typhoid and paratyphoid sera are used. In this way a large number of colonies can be rapidly examined. Should complete agglutination occur, then the remainder of the colony is inoculated into tubes containing various nutrient media. From the academic point of view, a considerable number of these are required, but, in practice, it is found that about three amply meet all the necessities, of which ordinary agar slope, litmus whey, and neutral red agar, or grape sugar, are most commonly used.

The following is a complete list of the different media with the methods of preparation :—

(*a*) *Barsikow's Milk Sugar.*—Made thus : (i.) 1 gr. nutrose 0·5 gr. NaCl, aqua distill, 100 cc. Sterilise ; filter several times to clarify. (ii.) 5 cc. litmus solution (Kubel and Tieman), 1 gr. milk sugar or grape sugar, or mannite, maltose, &c. Sterilise six to eight minutes. Cool to 60° C. Mix (i.) and (ii.). Sterilise for ten minutes on three successive days. (*b*) *Mannite*, as above. (*c*) *Barsikow's grape sugar*, as above. (*d*) *Litmus whey:* 500 cc. milk; add 10 to 12 ccm. N/I solution HCl to precipitate casein. Neutralise with soda solution. Boil one to two hours. Let the precipitate fall to the bottom. Take 100 ccm. of fluid and add 5 ccm. litmus solution. Place in tubes, sterilise two to three hours at 100° C. (*e*) *Neutral broth agar:* agar 2 per cent., grape sugar 0·3 per cent., neutral broth solution 1 ccm. (saturated watery solution of Ehrlich's neutral broth). Mix; sterilise.

The following table shows the effects of growth of *B. typhosus*, *B. coli com.*, *B. paratyphosus*, A. and B., *B. dysentery* (Shiga) and *B. Gaertneri* in various media.

Should the agglutination be positive in 1—100 dilution of serum, and the organism give characteristic reactions in the various media, the diagnosis of typhoid or paratyphoid, as the case may be, can then be made. Only in exceptional cases is it necessary to perform the Pfeiffer experiment.

The above is a description of the routine examinations made at

the Institutes. In addition to the urine and fæces it may, occasionally, be necessary to examine expectoration from the lungs, pus, and *post-mortem* material. The procedure is exactly similar to that adopted in the examination of fæces.

To determine the presence of typhoid bacilli in the blood, it is necessary to take about 5 cc. from a vein and add to it a large quantity of sterile bouillon to neutralise the bactericidal substances present in the blood.

The determination of *B. typhosus* in water is not very satisfactory.

—	Bouillon. Gas tubes	Mannite bouillon	Milk	Barsikow's milk sugar	Barsikow's grape sugar	Litmus whey	Neutral red agar
Control	No gas ..	Blue ..	Unaltered	Blue ..	Blue ..	Violet ..	Dark red; no gas.
B. typhosus ..	No gas ..	Red; no gas	Unaltered	Unaltered	Red	Slightly red	No change; no gas.
B. coli communis	Gas ..	Red; gas	Coagulated	Red; coagulated	Red; coagulated	Red	Fluorescent; gas.
B. paratyphosus (A)	Gas ..	Less gas; red	Unaltered	Unaltered	Slight red; coagulated	Slight red	Fluorescent; gas. Less than paratyphoid B.
B. paratyphosus (B)	Gas, slight	Less gas; red	After some weeks becomes yellow and strongly alkaline	Unaltered	Slightly red; coagulated	After 14 days forms a blue scum	Fluorescent; gas.
B. Shiga dysentery	No gas ..	No gas; blue	Unaltered	Unaltered	Bright red	Unaltered	Unaltered.
B. Gaertneri ..	Gas, slight	Red; gas	Unaltered	Slight red	Red; coagulated	Unaltered	Gas; fluorescent.

The above is an outline of the methods adopted in the campaign against typhoid in Germany.

It will be readily seen that in a *civil* population the practical difficulties are enormous. Isolation cannot be carried out in many cases, and the disinfection of the urine and fæces must be left in the hands of the individual himself, and whether the instructions are implicitly followed is, at times, questionable. So, therefore, under these circumstances, the progress must be slow. On the other hand, in the *army* it ought to be a simpler matter, because here the individuals are constantly under observation and discipline. It is a matter of common knowledge that to send a person harbouring the parasites of disease back amongst a number of

uninfected individuals, is a sure method of lighting up fresh infection. The danger of typhoid infection is that the individual, although appearing perfectly well, may harbour the bacilli and so infect others. The point of importance to remember is, that only by repeated bacteriological examination of the fæces and urine are we in a position to say when a man can safely return to duty without being a source of danger to his neighbours; and, further, only by this examination can the latent foci of the disease be discovered; these unrecognised harbourers of the disease, the "bacilli carriers," are the chief means by which the disease continues to spread, in spite of all improvements in sanitation.

After these investigations have been continued for some time, we get a valuable accumulation of scientific facts, which enables us to intelligently correct real hygienic faults.

It is an interesting fact that methods based on the same principles are employed in Germany to combat the spread of cholera, and our methods for the detection of the cholera vibrio are much more perfect than those for the *B. typhosus* in fæces, because we have in peptone water an excellent "enriching" medium for the vibrio of cholera.

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BUBONIC PLAGUE IN CAPE COLONY.[1]

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I.—Introductory.

I may first briefly refer to the geography of the Colony and the conditions as affecting plague existing at the time of the first introduction of the disease.

The three principal Ports of Cape Colony—Cape Town, Port Elizabeth and East London—have populations of, in round numbers, 77,000, 33,000, and 25,000 respectively. That of Cape Town comprises a large proportion of mixed race, known as the Cape Coloured, with whom may be classed Malays, together with a large number of natives, mostly male adults, who come here from the native territories to work; the latter were not at the time in any way segregated from the rest of the inhabitants.

The populations of Port Elizabeth and East London consist almost entirely of Europeans and natives. The Port Elizabeth natives occupied at the time several very insanitary and over-crowded areas in the town itself. The majority of the East London natives were segregated in a location outside the town.

In all three towns there was a sprinkling of Asiatics, both Indian and Chinese; also, owing to the state of war then existing, there was a very considerable surplus population of refugees from the Transvaal and Orange River Colony, a large proportion of whom were in poor circumstances and, as a result, the over-crowding in the poorer quarters of the towns, which had previously existed, more especially in the case of Cape Town, was much increased. Cape Town has a water carriage system for night soil; in Port Elizabeth and East London the pail system is in use; the general sanitary condition of all three towns was at the time exceedingly unsatisfactory.

In Cape Town the majority of the buildings and dwellings are of brick or stone, but many of these were dilapidated and rat-infested. In Port Elizabeth, except in the better quarters of the town, wood and iron structures predominate, and even the better-class houses and mercantile buildings frequently have insanitary

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yards with dilapidated wood and iron out-buildings or servants' quarters at the back. Similar remarks apply to East London, although the proportion of stone and brick buildings is somewhat larger than at Port Elizabeth. Mossel Bay may also be mentioned. This town has a population of 4,000, of whom about half are natives. Its sanitary condition in 1900-1 was deplorable; a large proportion of the buildings are of wood and iron, and the town was at the time overrun with rats. At the Port of Cape Town vessels as a rule come into dock and discharge cargo on to the quays direct; at East London, at the time of the first introduction of plague, only vessels of smaller size could cross the bar; goods from the remainder were landed by lighter. At Port Elizabeth and Mossel Bay all cargo is landed by lighter. The map (copy annexed) shows the *locale* of the various outbreaks and also the principal lines of the railway system of the Colony, which, as will hereafter appear, has played a very important part in the dissemination of plague.

From the commencement of the late war, in October, 1899, the trade of the several Cape Colonial ports, and more especially that of Cape Town and Port Elizabeth, increased enormously, many of the vessels arriving being from plague-infected ports, such as Buenos Ayres, Rosario, Rio de Janeiro, Santos, Bombay, Madras, Karachi and Mauritius. Hay, forage and grain, destined for the supply of the Imperial Forces, formed a considerable proportion of the cargoes, and enormous stores of these supplies accumulated in Cape Town in the area of the docks known as the South Arm, which was entirely given over to the Military authorities, and in Port Elizabeth in the neighbourhood of the principal landing jetty and in the Harbour Board Stores along the foreshore.

II.—History of Plague in the Colony.

Plague on s.s. "Kilburn."—On March 5th, 1900, the s.s. "Kilburn" arrived at the Port of Table Bay from Rosario with a cargo of forage, and having on board three members of the crew ill with a disease which, on investigation, was found to be plague. The vessel had left Rosario, where she had been in dock for some four weeks, on February 15th, 1900. Whilst there all members of the crew were frequently ashore. Plague was first officially declared present in Rosario on February 1st, 1900, although there is reason to believe that it had existed, both in man and rodents, for some considerable time previous to that date. The first case of illness on the "Kil-

burn" occurred on February 18th, three days after leaving Rosario; further cases occurred on February 23rd and March 3rd. On this latter date the captain of the vessel died suddenly after an illness of about twelve hours' duration. From the history of his illness, obtained from the officers of the vessel, the balance of probability would appear to be that the cause of death was some acute cerebral affection, but plague cannot be definitely excluded. Subsequent to the vessel's arrival at this port two cases occurred, one on March 7th and another on the following day. All five cases were of the bubonic type and all recovered. There were very few rodents on board and no trace of plague infection was found amongst them during the disinfection of the vessel.

Izeli.—On October 24th, 1900, an outbreak of disease occurred at Izeli, an out-of-the-way part of the King William's Town district. The first case was that of a native who had returned sick from Modder River Remount Station, where he had been employed by the military authorities. Six cases, with four deaths, occurred before the outbreak was discovered and the nature of the disease definitely recognised. During the fortnight following the institution of precautionary measures seven further cases occurred, all of whom recovered. Of the twelve occupants of the hut to which the sick native came from Modder River eight were attacked. In the remaining five cases there was a clear history of exposure to infection. There were no rats in the locality.

At the time no feasible theory could be advanced to account for the occurrence of this outbreak. Investigations made at Modder River failed to discover any evidence of the existence of plague infection there, either amongst men or rodents. Subsequent events showed that in all probability the infection had almost certainly been conveyed to Modder River by infected forage or rats from the Cape Town Docks, where rats were, at the time, dying of plague.

Cape Town.—On February 1st, 1901, an unusual rat mortality at the South Arm was reported to Dr. A. J. Gregory, then Acting Medical Officer of Health for the Colony. On his examining one of the rat carcases, organisms presenting the microscopical characters of the *Bacillus pestis* were found, and on inquiries being made at the South Arm it was ascertained that a mortality amongst rats had been going on for at least some six weeks previously. Sick rats had been observed in the daytime going about in a dazed condition, and some had even been seen drinking out of a vessel of water in close proximity to people. On February 2nd a case of suspicious illness in a European clerk, who had been working for the military

authorities in a shed on the South Arm, was reported; he had been admitted to one of the suburban hospitals on a diagnosis of meningitis subsequently changed to that of enteric fever. Dr. Gregory examined this patient, found he had a large bubo in the left groin, and in material removed from the bubo discovered organisms microscopically identical with plague bacilli.

Inoculation experiments, both from the rat and the suspicious case in man, were at once carried out, but these took some time to develop, the animals inoculated not dying until the tenth day after inoculation; the experiments, however, eventually resulted in the confirmation of the diagnosis of plague in both instances.

From subsequent investigations it would appear probable that the rat mortality had been going on in the neighbourhood of the South Arm and the large stacks of grain and forage accumulated in the vicinity from about August, 1900; it was also found that there had been two cases of death after severe illness of short duration, on January 27th and 28th respectively, both in persons in military employ at the South Arm.

A further case of plague in a native employed at the South Arm was discovered on February 6th, and from this date up to the end of February forty-five cases in all were discovered, of whom twenty worked in the Dock area or its immediate vicinity.

When the outbreak was first discovered there is no doubt that the rat population was already widely infected throughout the dock area and the portion of the town adjoining. Shortly thereafter, however, an exodus of rats from this locality occurred, principally to the upper parts of the town and to Green Point Common where the Military Authorities had a large Remount Camp. In the wake of this spread of infection cases of plague in man occurred, and in the great majority of the cases rodents recently dead of plague were found either at their residence or place of work. The numbers of rat carcases so found were enormous, thirty to fifty or more being sometimes found under the floors of one building. Precise information on this point has not in all cases been recorded, but it would probably be well within the mark to say that rats dying of plague were found, either at the residence or place of work, of 70 per cent. of the persons attacked by the disease. As compared with subsequent epizootics in other parts of the Colony, the disease would appear to have become diffused amongst the rat population with great rapidity, and ultimately to have almost exterminated it, a circumstance to which the rapid subsidence of the outbreak in June and July and its almost complete cessation in August of the same

year was probably to a very large extent due. The epizootic extended to the suburbs of Woodstock and Sea Point, which are continuous with Cape Town, but did not spread to the residential suburbs along the suburban railway line. A notable rat mortality from plague occurred, however, at Simon's Town; it was first discovered in the Naval Dockyard, and here also a sharp outbreak in man occurred. The exact means by which the infection was conveyed to Simon's Town were not traced. In a large proportion of instances in which infection was attributable to a previous case in man, the disease in the infecting case was of the pneumonic type. The more common bubonic form of the disease in man appeared to be only slightly infectious.

The outbreak virtually ceased both among rats and human beings towards the end of 1901, after a run of about eight months, although one or two dropping cases of plague were discovered, both in human beings and rats, after that date.

The last case in man occurred on January 2nd, 1902, and the last plague-infected rodent was found on the 19th of the same month. During the outbreak 766 cases were discovered, causing 371 deaths.

During the course of the outbreak, two cases in members of the Loyal North Lancashire Regiment were exported to Mafeking whilst in the incubation state of the disease; no extension of the disease, however, occurred at that place.

At Somerset West five cases were discovered, the first, a "pneumonic" case, having been infected in Cape Town. Two other cases, both infected in Cape Town, were discovered in the same district.

Imvani.—In May, 1901, a probably plague infected rat was found at Imvani. Investigations were at once made as to the existence of infection amongst the human and rodent population of that locality, but with negative results. A fatal human case occurred there about a month later, but in this case the evidence went to show that infection had been introduced by a relative who had shortly before arrived from Cape Town and had for some time stayed in the same house as the deceased.

Port Elizabeth.—On April 12th, 1901, several plague-infected rat carcases were discovered at Port Elizabeth in the vicinity of a large stack of forage which had been shipped from Buenos Ayres some months before. Four days later a case of plague was discovered in the person of a native who had been working on the stack in question. It was at first thought that the rat mortality was localised to this stack and its vicinity, and an attempt was

made to prevent its spread by the erection of rat-proof fencing. It was soon found, however, that the infection had already spread to the stores in the vicinity and to the large Military Remount Camp in the North End of the town, to which part of the stack of Buenos Ayres forage had some weeks previously been conveyed. The progress of the epizootic along the Harbour Board area and its spread to the stores adjoining and into the town was traced, step by step, and in its wake cases of plague in man followed. In the first five cases discovered, rats sick or recently dead of plague were found at the patient's place of work. The first twenty-three cases occurred in persons residing or working in the Harbour Board area or its immediate vicinity; in none of these cases was there any history of exposure to infection from a pre-existing case. Since this first introduction of the disease, Port Elizabeth has never been entirely free from plague infection; however, no serious outbreak has at any time occurred, the greatest number of cases discovered in any one week being eighteen. In one instance, namely, in the latter part of 1902, a period of eighty-two days elapsed between successive cases in the human subject. Compared with the Cape Town epizootic the diffusive power of the infection at Port Elizabeth appears to have been smaller, and this character it has retained throughout. It has been a common occurrence to find the rats in one block of stores dying of plague in small numbers for perhaps several weeks, whilst the rat population of the adjoining block remains healthy. On the latter at last becoming infected the same process of slow diffusion goes on.

The occurrence of human cases has throughout been associated in the closest manner with the course of the epizootic, the number of cases increasing and dimishing synchronously with it. Any considerable extension or recrudescence of the epizootic in any particular area has generally been followed by the occurrence of cases in man in the same area, and where the discovery of human cases has been the first intimation, evidences of an antecedent rodent mortality have as a rule been found. In the 337 cases which have been discovered in Port Elizabeth up to 15th July, 1905, the causes of infection have been adjudged to be as follows: Infected rodents, 226; previous human cases, 24; infected cats, 1; fomites (infected clothing, &c.), 6; doubtful, 80.

During 1901, two cases of plague were exported to Uitenhage. In the first case no extension of the disease took place, but in the second, which was only discovered after death, three other persons living in the hut with the deceased and who had attended him

during his illness developed the disease. Another case was exported to Grahamstown in May, 1903, a native male adult who had evaded the "pass" system by impersonation. He died on the railway premises at Grahamstown, the diagnosis being made *post-mortem.*

Mossel Bay.—On October 5th, 1901, a sick rat killed in a bonding store near the landing jetty at Mossel Bay, together with a mouse found dead on the jetty, were forwarded to Cape Town for examination. Both were found to be plague-infected.

During the next few weeks sick and partially paralysed rats were noticed in several parts of the town, and dead rats were found in a number of stores in the neighbourhood of the landing jetty and between piles of sleepers and crated goods stored in the same locality. There were at the time about 100 of these open cases or "skeleton" crates lying about in the neighbourhood of the jetty, in addition to large numbers in stores in the vicinity. Many of these had come from Cape Town, others had been shipped from foreign ports, landed at Cape Town, where they had been stored for varying periods in the Harbour Board area, and subsequently sent on to Mossel Bay. On November 10th, 1901, a coloured female, a domestic servant in a house adjoining the bonding store in which the first plague-infected rat had been discovered, became ill with fever and a painful swelling over the left clavicle; she died suddenly on November 13th. The case was attended by a local practitioner who did not at the time suspect plague; there can, however, be little doubt that the case was one of plague. On December 1st a second case was discovered in a European female residing in an earthen-floored cottage in the Market Square, in the vicinity of which several dead and sick rats had been seen about a fortnight previously. During the outbreak, 13 cases in all occurred, with 6 deaths. In 12 of the cases infection was adjudged to be due to plague-infected rats either at the residence or place of work; in none of these was there any history of association with pre-existing cases of the disease in the human subject. In the remaining case there was a history of association with a pneumonic case, but infection from rats could not be absolutely excluded, as the carcases of rats which had almost certainly died of plague, were found within about twenty-five yards of the patient's dwelling.

During the early part of the outbreak two cases of plague were exported to Ladysmith, some sixty miles inland, infection in both being traceable to plague-rat infested stores in Mossel Bay. No extension of the disease took place at Ladysmith.

Graaff-Reinet.—In January, 1903, a mortality from plague was discovered among rats at Graaff-Reinet, a town of 10,000 inhabitants, some 140 miles inland from Port Elizabeth, with which it is connected by rail. Although the mortality was first discovered in the town itself, investigations carried out during the course of disinfecting operations went to show that the infection had spread from the railway station premises, under the floors of which mummified rat carcases were found. Whilst engaged on the investigation of these premises, the officer in charge observed an apparently sick rat to leave a goods truck which had just arrived from Port Elizabeth. The rat was killed and on examination found to be plague-infected. During the course of the epizootic, which lasted for ten weeks, a doubtful case of plague occurred in a European lady who died after an illness of short duration. Suspicion was not aroused until after death and interment, but from the clinical history there is very little doubt that the case was one of plague.

East London.—On February 19th, 1903, suspicious mortality amongst rats was discovered to be taking place in the Harbour Board area at East London, carcases being found in a baggage shed on the wharf. The precise date and mode of introduction of the infection have not been ascertained. During the succeeding fortnight a number of rat carcases were found in various parts of the Harbour Board area. The rodent population of the adjacent parts of the town became infected and a severe and widespread epidemic resulted. The first case of plague in man was discovered on March 19th, a second on the following day, a third on March 28th, 5 further cases during April, 13 during May and 3 during July. During this period plague-infected rodents continued to be found in various parts of the town, and in every instance the human cases were more or less clearly traceable to infection from rodents. During the month of August the rats on board the ship "Cromartyshire," which had been lying at the wharf for some time previously, were found to be plague-infected; over 100 plague-infected rodents were found dead or destroyed during the disinfection of the vessel. Plague infection still exists amongst the rodent population of the town, and cases in man occasionally occur. The relationship between the rodent epizootic and cases in man has been as marked as at Port Elizabeth. In the 95 human cases discovered in East London up to the 15th ultimo, the causes of infection have been adjudged to be as follows: Infected rodents, 63; previous human cases, 7; infected cats, 2; fomites, 1; doubtful, 22.

s.s. "Nevassa."—On March 3rd, 1903, a cargo and coolie ship, the S.S. "Nevassa," arrived in Cape Town with 100 Asiatic passengers and a crew of sixty-five Asiatics under European officers. Three days later a member of the Asiatic crew died suddenly, plague being diagnosed *post mortem*. During the next few days four further cases occurred on board. In reply to enquiries the master and officers emphatically asserted that no rat mortality had been noticed on board, but after fumigation by the Clayton apparatus a large number of plague-infected rodent carcasses were found. Some of the carcases were in an advanced state of decomposition, proving that the mortality had been going on for some time. After the departure of the vessel, the Quartermaster, an intelligent Urasian and one of the cases, admitted that dead and sick rats had been noticed for several weeks prior to the vessel's arrival in Cape Town. He further stated that he had himself brought the matter to the notice of the Captain and suggested that the cause might be plague, but that he had been told that he would be discharged at the first opportunity if he said anything further about the matter.

King William's Town.—On March 7th, 1903, a native working in the railway goods shed at King William's Town died suddenly, plague being diagnosed *post mortem*. Another native employed in the same shed became ill with plague on the same day. Simultaneously with these cases two Europeans, one employed as a checker in the same goods shed and the other employed in handling goods outside the shed, developed plague. Enquiry elicited the fact that for some time previously offensive smells had been noticed in the goods shed. On taking up the floor a number of rats dead of plague were found. Further investigations showed that the infection had already spread beyond the railway premises. An epizootic developed amongst the rat population, accompanied by further cases of the disease in man. Thirty-three cases in all occurred during the epidemic; in twenty-five of these infection was adjudged to have been through the agency of rodents, in two the infection was attributed to contact with pre-existing cases, whilst in the remaining five the mode of infection was doubtful. The last case of the epidemic occurred on June 6th, 1903, but plague-infected rats continued to be found up to September 5th, following. A further case of plague in man occurred in November, 1903, the source of infection not being traceable. From this date (1905) no plague infection was discovered until March of the present year when a fugitive case infected in East London was found dead in the location and plague diagnosed

post mortem; the wife of the patient subsequently developed the disease. On April 19th last, a severe mortality amongst rats was discovered to be occurring in a store in the centre of the town. Some of the carcases were two or three weeks old when discovered, and there is reason to believe that the occupants of the store had wilfully concealed the mortality. On search being made further, though more recent, carcases were found in adjoining stores, and it was evident that the infection had already become disseminated. The only likely means of introduction of the infection which could be discovered was by a consignment of rice in coarse linen bags which had been received from a plague-rat infested store in East London some five weeks previously. Further cases of the disease in man followed, the first five cases being in persons who worked in or had been employed in connection with the store in which the rat mortality was first discovered, one being in a member of the firm. Plague-infected rats and an occasional infected cat continue to be found in various parts of the town, but no case of the disease in man has been discovered during the past nine weeks.

Kei Road.—In April, 1903, during the course of the first epidemic at King William's Town, a case of plague occurred at Kei Road in the person of the station-master's wife. On disinfecting the railway premises the carcases of a number of rats dead of plague were discovered. The railway premises are some distance from the village, and it was at the time thought that the infection had been completely eradicated. During the following June, however, infected rats were again discovered in the railway premises, and on investigation it was found that the epizootic had extended to the rodents in the village.

The whole area was then dealt with and the infection eradicated.

Burghersdorp.—On March 7th, 1903, the Station-master at Burghersdorp reported that the carcases of several rats had been found on the railway premises; the carcases had, unfortunately, been at once destroyed. On April 1st following, the carcase of a rat was forwarded by the Station-master to the Public Health Laboratory and was found on examination to be plague-infected. On enquiry it was found that this rat had been caught in a cage trap in the railway goods shed, kept for three days, during which period it remained apparently healthy, then killed and forwarded for examination. On further investigation twenty-five mice, dead of plague, were found in a stack of forage adjoining the railway station. Subsequently a few plague-infected rats were found in Burghersdorp and in a Police Camp about eighteen miles distant.

to which some time previously supplies of grain and forage had been forwarded from the railway station.

Queenstown.—On April 28th, 1903, the rats in the railway station premises at Queenstown were discovered to be dying of plague. On investigation it was found that the infection had already extended to the rat population in the vicinity. No case of plague in man was discovered up to June 13th, when a "pneumonic" case occurred in a native residing in the Municipal location; on the following day a second case, also of the "pneumonic" variety, developed in the same hut. As the result of enquiries which were then instituted, it was discovered that two previous cases had occurred; the first of these, a native hawker, had lived for some days in the same hut as the cases already mentioned, become ill on the 18th, and died on June 25th. He had been attended by a local medical practitioner who had certified death as due to pneumonia. The diagnosis in this case was never definitely established, but there can be no reasonable doubt that the case was one of pneumonic plague. The second case, also in a native male, residing in an adjoining hut, occurred on June 26th; the patient died on the 29th, was buried without any medical certificate and without having come under medical observation. The body was exhumed on July 4th, and a diagnosis of plague made *post mortem*. Following on these four cases three further cases occurred, infection in each case being traceable to a previous case. All these seven cases were of the pneumonic or pneumo-septicæmic variety and all proved fatal. Two more cases occurred, one in July and one in August, infection in both cases being traceable to rats. The last discovery of a plague-infected rat was made on January 29th, 1904.

Seymour.—On May 7th, 1903, rat mortality from plague was discovered in the Cape Police Camp and in the village of Seymour. Infection was in all probability derived from King William's Town, from which Seymour obtains, by road transport, practically all its supplies. The rodent infection was promptly eradicated, and no case in man occurred.

Thomas River.—On May 9th, 1903, a rat, dead of plague, was discovered in a hen's nest at the Police Camp, Thomas River, in the Cathcart District. The Camp is situated about fifty yards from the railway line, and close to a water tank at which goods trains frequently stop to take in water. The rats and mice in the Camp stables and premises generally were quite healthy, and no further evidence of plague was discovered. In all probability the infected

rat had left a goods train from East London whilst the engine was taking in water at the tank adjoining the Camp.

Riversdale.—On June 20th, 1903, a cat, dead of plague, was discovered at Riversdale. The source of infection could not be traced. No further evidence of infection was discovered.

Knysna.—On October 1st, 1903, a plague-infected rat carcase was found in a large store near the landing jetty at Knysna, several more plague-infected carcases being discovered in the same store during the next few days. Investigation revealed the fact that the infection had already become considerably disseminated among the rodent population of the locality. Both the town and the surrounding district, which is densely wooded, were over-run with rats to an extraordinary extent; during the epizootic which followed a very large number of plague-infected rats were discovered in Knysna, and some were found at places twelve and eighteen miles distant from the town; three plague-infected cats were also discovered. On October 10th, a European female child residing in a cottage adjoining the premises in which rats dead of plague were first found, was discovered to have contracted the disease. The case was a mild bubonic one and terminated in recovery. No further cases occurred.

s.s. "Agnar."—In November, 1903, about a month after the first discovery of plague-infection at Knysna, a small coasting steamer, the s.s. "Agnar," arrived in Cape Town from that port, and a dead rat discovered on board was found to be plague-infected. On the disinfection of the vessel with the Clayton apparatus the carcases of six rats and thirteen mice were found but were all free from plague. It is practically certain that the infected rodent had gained access to the vessel at Knysna.

Lady Grey Bridge.—On November 11th, 1903, rat mortality from plague was discovered at the goods shed, Lady Grey Bridge, a village distant about thirty-eight miles from Cape Town. The area was at once systematically disinfected. Over 100 plague-infected rats and mice were found in the goods shed; a number were also found in its immediate vicinity. The work was completed on December 8th, subsequent to which no plague-infection, beyond a much decomposed carcase found on December 22nd, was discovered.

Grahamstown.—During May, 1904, rats in the goods shed at Grahamstown were found to be dying of plague. Steps were at once taken to limit and eradicate the infection. This was successfully accomplished, no spread taking place to the town and no case in man occurring.

Uitenhage.—During April of the present year (1905) rats, dead of plague, were discovered in Uitenhage, and on investigation it was found that the infection had become considerably disseminated. Plague-infected rodents continue to be found there occasionally; no case of plague in man has so far resulted.

The following are the number of cases and deaths from plague in the several races occurring in the Colony up to date :—

	European	Coloured	Native	Asiatic	Total
Cases	328	474	435	68	1,305
Deaths	99	257	257	52	665
Case mortality per cent. ..	30·2	54·2	59·1	76·0	50·9

The disease has principally affected the poorer classes of the community; few well-to-do Europeans have been attacked. The great majority of persons contracting the disease have either been infected at their place of business or work, or their residences have been rat-infested.

III.—Seasonal Prevalence of Plague.

In connection with this question of seasonal prevalence, no definite general correlation between temperature or rainfall and the epidemic prevalence of the disease have been observed, though there have been a number of instances where an increment of diffusibility would seem to have followed rains. Further enquiries into this matter are being carried out. Broadly speaking, the period of maximum prevalence has coincided with or followed the period of autumn rains. I am unable to say whether, in accordance with the views recently advanced by Mr. Baldwin Latham, this is the period of the year when exhalations from the ground are greatest, as no investigations into the pressure differences which are the causes of such exhalations would appear to have been carried out in South Africa. I shall not be surprised if future investigations show that the seasonal prevalence of the disease is intimately connected with the effects of seasonal and climatic conditions on insect life and activity. It is known that flea larvæ are very susceptible to the desiccating effects of dry heat, and that a large proportion of those hatched during the hot dry season die; the chances of survival and of reaching the final stage of development are greatest in the case of larvæ hatched during periods of atmospheric humidity. Observations of a general kind which have been made in the Colony go

to show that fleas are more numerous during autumn, but this point can only be satisfactorily cleared up by a series of careful observations extending over a period of several years.

IV.—Plague in Animals other than Rats.

Mice.—In all the epizootics, plague-infected mice have frequently been found. They do not appear to play any very important part in the spread of the disease, owing largely, no doubt, to their stay-at-home habits. They, however, live in closer association with man than do rats, and it seems highly probable that they sometimes act as connecting links in the chain of infection from rats to man. In the disinfection of infected dwellings one frequently finds the carcases of rats dead of plague under the floors and dead mice in the upper parts of the house, in narrow spaces and crevices in walls and partitions, and in cupboards and behind shelving, especially in pantries or larders.

Veldt Rats (*Arvicanthus pumilio*).—Specimens infected with plague have frequently been found, especially at Knysna, where these rodents were very numerous at the time of the plague outbreak there. They only occasionally enter dwellings or other buildings.

Cats.—During the Cape Town epidemic some thirty-five dead cats were found and examined, of which twelve proved to be plague-infected. A considerable number of infected cats have also been found in Port Elizabeth, East London and King William's Town, indeed, infected cats have been found wherever there has been any considerable epizootic among rats. The case of the plague-infected cat at Riversdale has already been referred to. Four of the Cape Town infected cats had loose or injured teeth, a point of interest in view of the fact that buboes in cats are almost always cervical, so that infection presumably enters by the mouth, in all probability when feeding on rats or mice sick from plague. So far as I am aware cats do not, under ordinary circumstances, eat carcases found by them, although they may possibly do so when hungry. In one instance, at Knysna, a boy, the son of a local hotel proprietor, extracted with his fingers a loose tooth from the mouth of a favourite cat which had been ill for some time with swellings of the neck and lower jaw; the cat was subsequently found to have plague. The boy did not contract the disease. Plague in cats is usually of a subacute or chronic type, and the animal may survive for several weeks or may even recover. In one or two instances there is reason to believe that infected cats have been instrumental in spreading the disease among the rodent population of a pre-

viously plague-free neighbourhood. The cases of plague in man believed to have been infected by cats have already been referred to.

Dogs.—During the early stages of the Cape Town epidemic a large retriever—a frequenter of the South Arm—was found dead, with swellings on the neck due to plague. During the same outbreak a terrier working with the rat-catching staff developed a bubo in the neck, which suppurated. Plague bacilli could not, however, be detected in the discharge; the animal recovered. The majority of dogs appear to be insusceptible to plague. Large numbers have been used for rat-catching in plague-infected areas, at which work they are frequently bitten by rats and occasionally, no doubt, by an infected rat, but with the above-mentioned possible exception, none of these animals have contracted the disease.

Pigs.—No case of plague has been found in pigs. No inoculation experiments on pigs have been carried out.

Birds.—The disease has not been observed in pigeons, poultry or other birds. A number of experiments have been carried out on birds by Dr. G. W. Robertson, Bacteriologist to the Health Department, in which both virulent culture material and material taken direct from animals dead of plague were inoculated, in some cases subcutaneously and in others intravenously; all these experiments were negative.

In connection with Professor W. J. Simpson's statement in his Report on Plague in Hong Kong that turkeys, ducks and geese were found experimentally to be susceptible to the disease and that plague-infected poultry had been found exposed for sale on the market at Hong Kong, I note from the last report of Dr. William Hunter, Government Bacteriologist, Hong Kong, that during 1904 eighty-two fowls, fifty-seven ducks, and two geese were examined, all with results negative as to plague. Similar results are reported from Sydney and Natal. In the same report Dr. Hunter refers to the prevalence in Hong Kong of an infectious disease in fowls, in which he isolated a small non-motile bacillus showing bi-polar staining. This organism he identified as the bacillus of fowl cholera.

(*To be continued.*)

A RAPID MEANS OF STERILISING WATER FOR TROOPS BY USING "THERMIT" AS FUEL.

By Surgeon H. C. ROSS.
Royal Navy.

The chief difficulty in sterilising water for men on the march is the question of fuel; several water carts have been invented, especially since the war in South Africa, and much controversy on the subject has taken place both at the Royal United Service Institution and in the medical papers.

All these inventions are unsatisfactory because the fuel is bulky and a large quantity is needed to boil a small quantity of water.

Coal is very heavy and would necessitate special transport, which in war-time is impossible.

Oil and petrol are also found to be too bulky, and as they are inflammable liquids, leakage is a serious matter. An ideal water cart is a cart to be drawn by a horse or mule after the same pattern as the present water cart supplied to the Army, and it must have a means of boiling the water it contains; it is imperative to do this in a few minutes; if possible it should have a means of cooling the water after it has been boiled, and the fuel must be carried on the cart itself in sufficient quantity to last the company, or other regimental unit, for at least one week, boiling the water twice a day.

A Service water cart will hold about 108 gallons and it weighs about one ton when full.

The question of fuel has never been really overcome; the question of cooling the water after boiling is not very difficult, there being several apparatus on the market that will do this.

About six months ago I had an opportunity of seeing some experiments with a new material called thermit. The experiments I saw were the welding of steel rails by the thermit process. Up to a short time ago welding was done by the electric arc, which took several days to produce the necessary amount of heat. The amount of heat requisite for welding steel is enormous; 3,000° or 4,000° being required. The thermit process was invented about two years ago by Claud Votin; however, it did not come into general use at that time because a suitable reagent had not been found. The thermit process produces about 4,400° of heat in thirty seconds. Thermit itself is a powder of blackish-gray con-

sistency, composed of a mixture of aluminium and either ferric or ferrous oxide. When a small quantity of a reagent such as the peroxide of barium or chromium is placed on the surface of the mixture and a match is applied furious combustion takes place, together with the liberation of free iron in a molten condition and the production of intense heat. About half the thermit turns into iron and the other half into what is known as slag, which is composed of oxide of aluminium.

When I saw this experiment it struck me that it was a possible solution of the difficulty of boiling water for troops in war time.

On making further enquiries about the properties of thermit I found out that it must never be allowed to become damp, for when damp, if it is fired it may explode, and secondly, there is no doubt that the strange penetrating power of the molten iron is a great drawback in boiling water because it cannot be placed in any ordinary grate, also there is always the danger of it penetrating the boiler itself, which would cause leakage. Moreover, the heat is quite local and is almost entirely confined to the metal and slag, so that it could not be utilised in a grate or furnace under a boiler in the ordinary way.

These difficulties seemed at first to place a barrier in the way of using thermit, but now I think they can be overcome. The first difficulty is that it may explode if fired when wet, so it must never be allowed to be exposed in any way even to the air, and each charge, the exact size of which must be determined by experiment, should be enclosed in a gas-tight metal cartridge. To produce combustion it is quite unnecessary to allow air to come into contact with the thermit, so it may be fired in the cartridge by an electric circuit connected with a battery in the same way as a gun.

Each cartridge will contain about a pound or so of the mixture with a little of the reagent on the top (see fig. 1). Embedded in this reagent is half an inch of platinum or steel wire (fig. 1, A) which must be very thin, no thicker than No. 40 (B.W.g.); one end of this wire must be soldered on to the inside of the cartridge, the other end must pierce it and be insulated in its passage, this end is then fastened on to one insulated terminal, there being another non-insulated terminal on the top of the cartridge (fig. 1).

The moment these two terminals are connected with wires to the terminals of an electric battery, a dry cell would do (fig. 4, B), the platinum wire becomes red hot and fires the thermit, the great heat will then fuse the wire and the current will be automatically cut off, so that one cell will last for months. In this way no damp

or water can possibly get into the cartridge, so there is no danger of explosion.

With regard to the second difficulty, I propose to boil the water on the principle of a watertube boiler, there being only one tube coated with magnesite which will withstand the heat, and which will pass through the molten slag. The molten metal will be

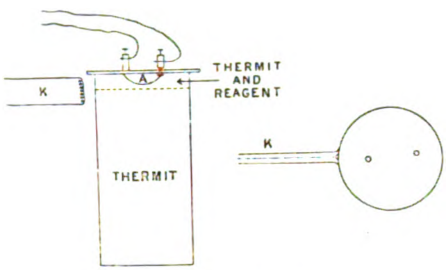


FIG. 1.—Elevation and plan.
Drawn to scale.

FIG. 2.—Elevation.
Drawn to scale

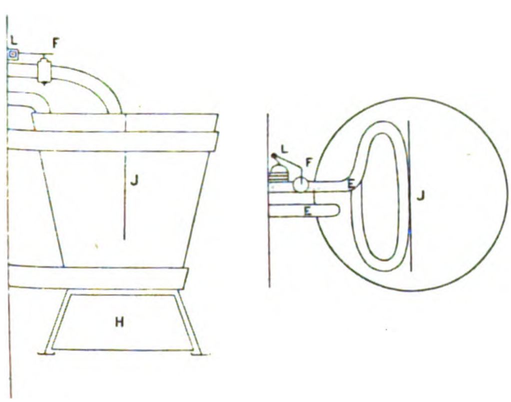


FIG. 3.—Elevation and plan.
Drawn to scale.

deflected and so will not be allowed to come in contact with the tube containing the water. Regarding the water cart which will boil the water by thermit:—It will be a cart containing two tanks (fig. 5, C and D), one above the other, each tank to hold 108 gallons, but it must be borne in mind that one tank only will be full at any given moment.

For although the water in the first place is poured into the upper tank, it will only be allowed to pass into the lower one after it has been boiled, and boiling will take place during its passage from the upper to the lower tanks. Connecting the two tanks is a spiral pipe made of thin steel coated with magnesite one inch in

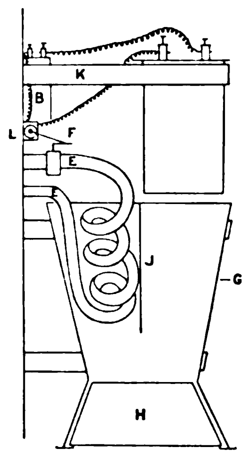


FIG. 4.
Drawn to scale.

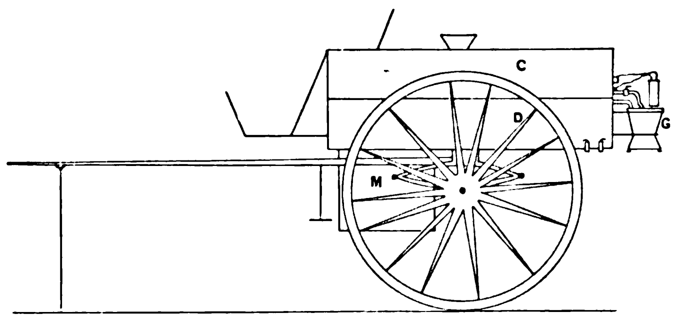


FIG. 5.
Drawn to scale.

diameter (figs. 2 and 4), which will allow all the water in the cart to be transferred from one tank to the other in ten minutes. At its exit from the upper tank there is a tap in the pipe (figs. 2, 3 and 4, F). All round this pipe is a receiver which is made of magnesite (fig. 3 and in figs. 4 and 5, G). It will be seen from

the drawing that the pipe (E) only takes up half the space in the receiver (G). It is in the other half that the molten thermit will fall from the cartridge.

The lowest point of the pipe (E) is two inches from the bottom of G, so that the molten metal will collect here and not touch E, though the slag will envelope E, and the pipe will be made white hot and will retain its heat for fifteen minutes or more. The water in its passage through E will be boiled.

The bottom (figs. 3 and 4, H) of the receiver is movable and can be taken out so that the molten metal and slag will fall out after the operation is completed, when the bottom can be replaced and the apparatus is again ready for use. To make the whole thing more complete, a metal and magnesite screen (figs. 3 and 4, J) might be placed in the receiver to prevent any drops or splashings of metal coming in contact with the tube.

The movable bottom (H) ought to be somewhat wedge-shaped so that the metal part of the thermit would be less likely to adhere to the receiver when cold.

A holder (figs. 1 and 4, K) should be supplied for the cartridge, so that the thermit can only fall into its proper place when fired.

And lastly, the tap might be connected with a switch (figs. 3 and 4, L) in the electric circuit, so that turning the tap on will also fire the thermit.

M in fig. 5 is a box fitted under the cart to carry a large supply of cartridges.

In the sketches the cooling radiator has been omitted; it would be attached to the pipe before it entered the lower tank.

The price of thermit at present is ten pence a pound.

The following letter has been received from Surgeon H. C. Ross in answer to an enquiry as to whether a model of his proposed steriliser has ever been constructed :—

To the Editor of the "Journal of the Royal Army Medical Corps."

"Dear Sir,—In answer to your letter concerning my paper on 'A Rapid Means of Sterilising Water for Troops,' no model has been made nor had I the means of making one, but I approached the Commander-in-Chief of this fleet in order to get the essential parts made on board H.M. repair ship 'Assistance.' I received an answer to say that there were not the materials for the apparatus

to be made, and further, the wreck of the 'Assistance' placed the manufacture of the steriliser out of court even if I had obtained the materials myself. It is unfortunate, but I am convinced the steriliser would work and that it would be worth while making a model, and would do so if I had the means and opportunities.

"Yours faithfully,

"HUGH C. ROSS,

"*Surgeon R.N.*

"*H.M.S. Commonwealth,*

"*Atlantic Fleet, at Gibraltar,*

"*December* 11*th*, 1905."

NOTES ON THE HEALTH OF EUROPEANS AND NATIVES IN PEKING.

By Captain F. E. GUNTER.
Royal Army Medical Corps.

(*Continued from p.* 30).

Part II.

Foreign.—Having then given a short account of the diseases of the Chinese, I next propose to show how disease affected the foreign troops in Peking. To do this I obtained from the Officers in medical charge of the seven principal Legation Guards besides the British, viz., the American, the Austrian, the French, the German, the Italian, the Japanese and the Russian, copies of their annual returns for the year 1903, and classified them according to the nomenclature of diseases, *vide* Table II.

Taking up the diseases for all troops systematically, the total admissions were 1,129, giving an admission rate of 688·35 per 1,000.

The chief admissions were :—

Malarial fever	76	or	38·66 per 1,000
Gonorrhœa	224	,,	113·94 ,, ,,
Soft chancre	75	,,	38·15 ,, ,,
Injuries	97	,,	49·39 ,, ,,

Enteric fever gave 26 admissions, or 13·22 per 1,000. It occurred principally in the late summer and autumn. The cause of it has not been fixed to any particular thing. The water in all the Legation Guards seems to be very carefully protected. I myself am inclined to think that the disease is due, in some cases, to rather faulty methods of disposal of sewage. The Legation area is in a confined space and the disposal of sewage is generally somewhat of a difficulty. From my own experience I do not think that the disease is common amongst the Chinese.

There were twenty-two cases of dysentery, or 11·19 per 1,000. These occurred chiefly in the summer and autumn. The malaria appears to have generally been of a mild type. It appears to have been pretty general throughout the year, but many of the cases, notably amongst the Americans, were contracted elsewhere than in Peking. Venereal diseases generally have caused a great number of admissions, gonorrhœa being especially prevalent, notably in the British Legation Guard. Comparative statistics, however, on

TABLE II.

Admissions—Troops per 1,000.

Diseases	Strength									
	American, 150	Austrian, 170	British, 250	French, 290	German, 300	Italian, 229	Japanese, 327	Russian, 250	Totals, 1,966	Per 1,000
Smallpox	6·67	..	4·00	..	..	4·37	..	..	15·04	1·53
Measles	..	..	4·00	..	..	..	..	..	4·00	0·50
Scarlet fever ..	..	..	..	..	..	..	..	..	..	..
Influenza	..	..	4·00	..	13·33	..	..	72·00	89·33	11·70
Mumps	26·67	..	..	..	..	..	..	..	26·67	2·04
Diphtheria ..	..	..	..	..	..	..	..	..	..	..
Simple continued fever	..	..	..	..	..	..	..	..	..	..
Enteric fever ..	73·33	11·76	24·00	..	20·00	4·37	..	..	133·46	13·22
Mediterranean fever	..	..	..	..	..	..	..	..	..	..
Cholera	..	..	..	..	..	..	..	..	..	..
Choleraic and epidemic diarrhœa	..	..	..	..	..	..	..	..	..	..
Dysentery	13·33	17·65	12·00	6·90	16·67	..	..	28·00	94·55	11·19
Yellow fever ..	..	..	..	..	..	..	..	..	..	..
Malarial fever ..	140·00	5·88	48·00	96·55	6·67	4·37	6·12	36·00	343·59	38·66
Erysipelas ..	..	..	8·00	..	..	..	..	..	8·00	1·02
Septicæmia ..	..	..	..	..	..	..	..	..	..	..
Pyæmia	..	..	..	..	..	..	..	..	..	..
Tubercular diseases	..	5·88	8·00	..	..	..	..	4·00	17·88	1·04
Primary syphilis ..	..	..	76·00	..	23·33	74·24	..	8·00	181·57	22·89
Secondary syphilis	106·67	..	72·00	17·24	..	..	6·12	4·00	206·03	21·36
Gonorrhœa ..	186·67	..	268·00	96·55	140·00	117·90	..	128·00	937·12	113·94
Alcoholism ..	20·00	..	..	..	3·33	..	..	..	23·33	2·04
Rheumatic fever ..	..	..	..	..	13·33	48·03	..	4·00	65·36	8·14
Rheumatism ..	13·33	..	..	13·79	6·67	8·73	3·06	16·00	61·58	7·63
Neuralgia	..	..	..	..	3·33	..	..	..	3·33	0·50
Mental diseases ..	6·67	5·88	..	3·45	..	..	..	..	16·00	1·53
Conjunctivitis ..	6·67	..	..	3·45	..	13·10	6·12	8·00	37·34	4·58
Disordered action of heart	6·67	5·88	..	..	..	..	..	..	12·55	1·02
Bronchitis ..	13·33	5·88	4·00	41·38	3·33	65·50	27·52	4·00	164·94	21·36
Pneumonia ..	6·67	5·88	12·00	6·90	..	..	21·41	..	52·86	7·12
Pleurisy	20·00	5·88	..	3·45	3·33	..	..	..	32·66	3·06
Sore throat ..	..	11·76	4·00	13·79	3·33	17·46	..	28·00	78·34	9·67
Tonsillitis . ..	20·00	..	4·00	..	3·33	..	..	..	27·33	2·54
Inflammation of intestines	73·33	35·29	..	31·04	..	126·64	..	20·00	286·30	30·52
Inflam. and congestion of liver	..	..	4·00	3·45	3·33	..	..	..	10·78	1·53
Jaundice	..	5·88	4·00	3·45	3·33	..	..	..	16·66	2·04
Soft chancre ..	46·67	29·41	60·00	72·41	3·33	48·03	..	60·00	319·85	38·15
Boils	6·67	..	..	20·69	..	39·30	..	20·00	86·66	12·21
Sunstroke and heat apoplexy	..	..	..	..	..	..	..	..	..	..
Other injuries ..	153·33	70·59	56·00	62·07	36·67	61·14	6·12	12·00	457·92	49·39
All other diseases	160·00	188·23	140·00	186·20	66·67	183·41	30·58	168·00	1,123·09	131·23
Totals ..	1,106·68	411·73	816·00	682·76	373·31	816·59	107·05	620·00	4,934·12	688·35

venereal diseases are not worth much, as some Medical Officers admit all cases of venereal, others do not.

American.—The American Legation Guard consists of 150 soldiers. The most prevalent diseases in the Guard were:—

Injuries	23
Gonorrhœa	28
Malaria	21
Secondary syphilis	16
Inflammation of intestines, catarrhal	11

The Medical Officer states that most of the malaria occurred amongst men who had served in the Philippines and was not contracted in Peking. Various causes have been assigned as to the outbreak of enteric, but it cannot be said to have been definitely traced.

Austrian.—The Guard consists of 170 sailors. Their health has been remarkably good.

British.—The British Legation Guard consists of 50 men of the R. G. Artillery and 200 British Infantry. There are also some 60 Followers, but they are not included in this Report.

The chief cases of admissions were:—

Gonorrhœa	67
Primary syphilis	19
Secondary syphilis	18
Soft chancre	15
Injuries	14
Malaria	12

The limited amount of bronchitis I ascribe to the large amount of cubic space allowed in the barrack rooms.

The cases of enteric have not been traced.

French.—The French Legation Guard consists of 290 men of the Corps Coloniale.

Their principal admissions were:—

Gonorrhœa	28
Malaria	28
Soft chancre	21
Injuries	18
Scabies	14

The Medical Officer accounts for the absence of enteric and practical absence of dysentery owing to the care which is taken of the water supply.

The scabies was contracted on board ship before arrival in Peking.

German.—The German Legation Guard consists of 300 men.

Their chief admissions were for secondary syphilis. They show an extremely good bill of health.

Italian.—The Guard consists of 229 sailors. The chief diseases from which they suffered were:—

Inflammation of intestines, catarrhal	29
Gonorrhœa	27
Indigestion	18
Primary syphilis	17
Bronchial catarrh	15

The Medical Officer accounts for the absence of dysentery to special care being taken to watch the food, especially vegetables, and to the continuous wearing of cholera belts. Diarrhœa occurred chiefly amongst the contingent newly arrived from Italy, who did not observe the same precautions as those who had been in the country longer. It was probably contracted outside the barracks. Treated in hospital for four to five days. They were admitted as a precautionary measure.

Japanese.—The Japanese Guard consists of 327 soldiers. The low admission rate amongst the Japanese is most remarkable.

The commonest diseases were:—

Bronchial catarrh	9
Pneumonia	7
Beri-beri	6

The Japanese Medical Officer accounts for the absence of enteric, dysentery and diarrhœa as chiefly owing to the knowledge of the soldiers of the dangers of getting these diseases, and to strict supervision and carrying out of sanitary precautions. The pneumonia and bronchial catarrh cannot be accounted for.

All cases of beri-beri, except one, were developed in Peking.

Russians.—The Russian Legation Guard consists of 250 soldiers, Cossacks and Infantry. The chief admissions were for:—

Gonorrhœa	32
Influenza	18
Soft chancre	15

The absence of enteric and diarrhœa is ascribed to the water being distilled and to the strict prohibition against buying mineral waters, &c., in the city. The dysentery was mostly contracted in Tientsin.

From the Table showing the number of admissions per 1,000 it will be seen that the different Legation Guards were affected very differently. For instance, one Guard may have a lot of diarrhœa but no dysentery or enteric, one Guard seemed to suffer

more from malaria, and so on. Being struck by this, I sent round a list of queries to the various medical officers asking them to state the amount of cubic space in their barrack rooms, condition of their latrines, the ration and so on. Their answers will be found in Tables III., IV. and V.

From a study of Table II. it must, I think, be concluded that as regards enteric fever we do not compare as favourably as we should with many of the other Guards. It must, however, be remembered that at the time these statistics were compiled the British garrison was living in converted Chinese buildings, whereas the other Guards were housed in European buildings. Moreover, the system of filth removal by means of Crowley carts is quite unsuited to Peking. The roads, even of the Guard, are defective, and it is impossible to prevent the contents of these carts from being spilt whilst traversing them. The evils of these carts can hardly be exaggerated. The matter has been strongly represented, and I hope that in course of time the defect will be remedied. Improvement is even now evident, however, for during the year 1904 only one case of enteric, and that imported, occurred up till the time I left, viz., October, and it is most improbable that there will have been any more admissions for this disease during the year, as it is rare in the winter time in Peking owing to the great cold.

The Russians seem to have suffered considerably from dysentery, but I am unable to account for this.

Malaria amongst the Americans was rife, but the medical officer states that it was, for the most part, contracted in the Philippines. Amongst British troops it has greatly diminished, and this I ascribe greatly to the prophylactic use of quinine.

Our admissions for venereal can only be called deplorable. That we should have 268 admissions per 1,000 for gonorrhœa, and the Austrians and Japanese 0, shows that there must be something wrong somewhere. Of course, it may be said that they do not admit their cases into hospital, but treat them as out-patients. Admitting that this be true, from conversations I have had with the medical officers concerned, I am convinced that the incidence of the disease is not a tenth of what ours is. British law being as it is, however, I own I do not see what steps can be taken to prevent infection of the men.

Bronchitis was extremely common amongst the French, Italians and Japanese, and rare amongst our men. I ascribe the difference to the liberal amount of cubic space allowed in our barrack rooms,

and to the fact that they are not over-heated as they are in some of the other guards.

Diarrhœa was extremely prevalent amongst the Italians. In the British Guard there were no admissions for this disease. Perhaps the difference in the ration may account for this.

In conclusion, I may say that if enteric fever were stamped out, which I think it will be when the new barracks are completed, and the incidence of venereal checked, which it certainly could be by adopting some of the methods used in the other Guards, the health of the British Garrison would compare most favourably with any of the others.

TABLE III.

CUBIC SPACE IN VARIOUS BARRACKS, &c.

Cubic Space in Feet.

American	700	German	812—848
Austrian	805	Italian	480
British	Varies, but average is over 1,100	Japanese	491
French	565	Russian	583

VENTILATION.

American.—By means of special inlets and outlets; not satisfactory.
Austrian.—Natural, by doors and windows.
British.—Natural, by doors and window.
French.—Natural.
German.—Special openings in ceiling.
Italian.—Natural.
Japanese.—Natural.
Russian.—Summer, natural; winter, by extraction through stoves.

WARMING (ALL LEGATIONS USE STOVES).

DRINKING WATER. HOW IS IT OBTAINED? HOW TREATED BEFORE USE?

American.—From two wells, one deep and one shallow. Water for drinking and cooking purposes is distilled.

Austrian.—From a special well, is boiled and refrigerated. A free ration of tea is allowed.

British.—From a special well, all water is distilled.

French.—All the water is distilled.

German.—From a well in barracks. Water boiled.

Italian.—From well in barracks. They get a weak infusion of tea as a free ration. All water is boiled.

Japanese.—From artesian wells. Distilled.

Russian.—All water distilled.

LATRINES.

What System is Adopted in your Barracks? Is it Satisfactory?

American.—The dry earth system is used. Iron and earthenware receptacles are used for garbage, excrement, &c. They are emptied twice daily. Not considered so satisfactory as water system.

Austrian.—Separate from the barracks. Buckets, which are emptied every morning. Disinfection with lime, especially in summer. A 50 per cent. solution of lime is made up to eight times the quantity of water. No smell.

British.—Dry earth system with buckets. These are emptied and the refuse removed by Crowley's carts. The system is open to improvement.

French.—They are separated from the barracks.

German.—Isolated latrines. Buckets emptied daily. Satisfactory.

Italian.—Pavilions separated from living rooms. Fæcal material is placed in a dark well. The system is not considered very satisfactory.

Japanese.—Isolated pavilions. Buckets.

Russian.—Pavilions connected by corridor with barracks. Buckets cleaned daily. The latrine is ventilated by a special chimney.

Malaria.

Are any Prophylactic Measures Taken? If so, What?

American.—Men who have had malaria have to use mosquito curtains. All localities admitting of stagnant water are filled in, and places not admitting of this are protected by kerosine oil poured in; quinine is not given prophylactically.

Austrian.—No prophylactic measures are adopted.

British.—Every man in barracks had quinine during the summer months. The malaria was much less during 1903, when this was given, than it was in the year previous, when it was not administered. The conditions of life are much the same.

French.—Mosquito curtains on windows and over beds. Prophylactic treatment with quinine is not considered necessary.

German.—Wire nets are placed on windows, mosquito nets on beds. Quinine is given to those men who have suffered from malaria.

Italian.—No prophylactic treatment with quinine is used, as it has been proved to be useless. Mosquito nets are placed over windows and doors, but this is done rather to prevent the annoyance from the mosquito than to prevent malaria, as many observations show that the malaria mosquito is most uncommon.

Japanese.—Prophylactic quinine not given. Mosquito nets on windows and round beds.

Russian.—No prophylactic found necessary.

Table IV.

Rations, &c., of Different Legation Guards.

What is Average Age?

American	21 to 25.	German	Over 25.
Austrian	23 to 25.	Italian	20 to 25.
British	20 to 25.	Japanese	21 to 22.
French	24 to 28.	Russian	24.

How many Nights in Bed?

American	3 to 4.	German	4.
Austrian	3.	Italian	3.
British	4 to 7.	Japanese	2.
French	5.	Russian	3.

Clothing, of what does it Consist?

American.—Winter: woollen. Summer: cotton. In the summer a slouch hat is worn. No helmet.

Austrian.—In winter thick vest, cloth clothing. Sentry has fur-lined cloak. Boots fur-lined. In summer thin duck. Sailor hat with white cover. No helmets. Since June, 1904, sentries wear helmets during heat of day.

British.—In winter khaki serge. Thick woollen under-clothing. "Coat, warm, British," and fur caps. In summer khaki drill. Helmets.

French.—In winter the overcoat with hood. Summer khaki. Helmets are worn.

German.—Winter: woollen. Summer: khaki. Helmets are worn.

Italian.—Winter: as in Italy. The sentry has a fur-lined cloak and a thick vest. Summer: cotton with straw sailor hat.

Japanese.—Winter: shirt, vest, stockings and gloves, &c., woollen coat, overcoat, and trousers, cloth, fur waistcoats. Summer: linen entirely. No helmets.

Russian.—Winter: trousers and blouse of cloth. Instead of stockings "fuss lappen" wrapped round legs. Frock, grey cloth. Stock round neck, ear flaps, Astrakan caps. Summer: trousers, thin dark stuff, white blouse, long boots, cap with white cover. No helmet.

Food.

American.—Beef, 20 ozs., or Bacon, 12 ozs., or tin meat, 16 ozs., or fish, 14 to 18 ozs. Bread, 16 ozs. Potatoes, 16 ozs. Beans, $2\frac{2}{5}$ ozs., or rice, $1\frac{3}{5}$ ozs., or hominy, $1\frac{3}{5}$ ozs. Fresh vegetables when procurable. Dried or evaporated fruits: 30 per cent. of issue to be prunes. Coffee, $1\frac{7}{25}$ oz., or tea, $\frac{8}{25}$ oz. Sugar, $3\frac{1}{5}$ ozs. Vinegar, $\frac{8}{25}$ gill. Pickles, $\frac{4}{25}$ gill. Salt, $\frac{16}{25}$ oz. Pepper, $\frac{1}{25}$ oz. Alcohol not given.

Austrian.—Tea, q. s. Bread, 20 ozs. Beef, 16 ozs. Potatoes, 4·80. Rice, 3·17. Paste, 0·77. Peas or beans, 0·70. Cheese, 0·35. Lard, 0·53. Sugar, 0·90. Salt, 0·90. Tea, 0·10. Pepper, 0·008 pint. Oil, 0·008 pint. Vinegar, 0·1256 pint. Claret, 1·10 pint.

British.—Bread, 16 ozs. Meat, 20 ozs. Rice or flour, 2 ozs. Sugar, $2\frac{1}{2}$ ozs. Pepper, $\frac{1}{36}$ ozs. Potatoes, 12 ozs. (fresh). Vegetables, 4 ozs. Tea, 1 oz. Alcohol not part of ration.

French.—Eggs, Fish, Beans, Potatoes, Haricot beans. Meat, 8·8 ozs. Wine, 18 ozs. Rum, 1 oz.

German.—Meat from their own slaughter-house. Bread from their own bakery. Food contains: Proteids, 5·3 ozs.; Fats, 3·5 ozs.; Carbohydrates, 29·0 ozs.

Italian.—Bread, 24 ozs. Flesh, 12 ozs. Rice, 3·5 ozs.* Pudding, 4 ozs. Peas, 3 ozs.† Beans, 3 ozs.* Potatoes, 8·8 ozs.* Coffee, 0·5 oz. Sugar, 0·9 oz. Salt, 0·7 oz. Lard, 0·5 oz. Oil, 0·4 oz.* Cheese, 0·3 oz.* Tomatoes, 0·5 oz.* Aniseed, 0·2 oz. Vinegar, 0·1 oz. Wine, 17·0 oz.

Japanese.—Rice, 26·8 ozs. Muji, 11·9 ozs. Miso, 2·6 ozs. Vegetables, 7·3 ozs. Sugar, 2·6 ozs. One of following: Fowl or beef, 3·8 ozs., or fish, 1·7 ozs. Eggs as required. Alcohol not given.

Russian.—Bread, 35 ozs. Flesh, 12·8 ozs. Grain, 3·3 ozs. Lard, 0·7 oz. Potatoes and other vegetables as required. Alcohol is not part of the ration, but "qwas," a drink made from black bread, is given as required.

TABLE V.

VENEREAL DISEASES IN DIFFERENT LEGATION GUARDS.

PROPHYLACTIC.

Do you Adopt any Prophylactic Measures? If so What?

American.—Prophylactic measures are advocated but are not compulsory. In this respect the men are, as a rule, very careless. Bichloride of mercury and potass. permanganate are the agents used. Monthly venereal inspections are held.

Austrian.—Prophylaxis consists in instilling 20 per cent. solution of protargol and glycerine into urethra; result good. Of those treated only 1·5 per cent. got venereal. Every soldier after visiting a brothel has to submit to this treatment. If he does not, and acquires venereal, he is punished.

British.—No.

* Four times a week. † Once a week.

French.—They have two licensed houses for women, which are inspected. All women infected are dismissed. Each woman receives solution pot. permang., which is supposed to be given to the soldiers for their use. The result is only fair.

German.—Washing of penis, &c. Instillation of protargol or nitrate of silver. The effect of this, especially in syphilis, is doubtful.

Italian.—All soldiers who have been to a brothel have to go to hospital to get disinfected. This consists in washing the genital organs with bichloride of mercury and then irrigating the urethra with a solution of pot. permang. 1 in 1,000. It is considered that venereal is diminished by these precautions.

Japanese.—Repeated and thorough lectures on the dangers and nuisance of venereal diseases. Punishment of those affected, a diminution of pay during treatment. A record is made in a man's service book when he gets venereal. This book has to be shown to his parents when on leave.

Russian.—Constant venereal inspections. No special licensed house for soldiers, but it is proposed to start one. The causes and dangers of venereal are explained to the men.

Primary Syphilis.

Are Cases of Primary Syphilis Admitted? If not Admitted, do Men do their Duty? If so, does this tend to the Formation of Buboes? Are Restrictions placed on Men, such as preventing them leaving Barracks, &c.? What Treatment do you Adopt and how long is it Continued?

American.—Not admitted unless complicated. All do duty, unless cooks, &c., who handle articles of food. No ill-effects from out-patient treatment; percentage of buboes not increased, and it is thought that being employed lessens mental depression. Not permitted to leave barracks. Treatment: Cauterisation and antiseptic dressings.

Austrian.—Not admitted into hospital. Men do "all duty" with this disease. No ill effects are noticed. "Light duty" given if considered necessary. Not permitted to leave barracks; wine ration stopped. Treatment: ung. hydrarg. locally. If glands are affected, local mercurial friction; after healed, mercury discontinued.

British.—Mostly admitted during the year 1903. Since then the men have been treated as out-patients. I do not think this causes much tendency to buboes. Men cannot leave barracks while suffering from primary syphilis. Hutchinson's pill mostly given. Treatment continued for a few months.

French.—All admitted. Treatment: Mercury internally, iodoform locally.

German.—All admitted. Treatment: Iodoform, mercury, &c., locally but not internally.

Italian.—All cases except two were admitted into hospital. Treatment: Subcutaneous injections of mercury (bichloride) 1·2 per cent. solution used.

Japanese.—No cases.

Russian.—All are admitted. After discharge from hospital no restrictions are placed on the men, except that for a certain time they live in a separate barrack. Treatment: No antisyphilitic treatment is adopted.

Secondary Syphilis.

Please Answer as for Primary Syphilis as far as it Applies.

American.—Not admitted unless special complications. Do duty without any ill effect. No restrictions are placed on the men as to leaving barracks. Treatment: Mercury, pot. iodid., bichloride and hyd. ung. are used. Duration of treatment: eighteen months or more.

Austrian.—Not admitted unless special complications. Do duty without any ill effect. No restrictions are placed on men as to leaving barracks. Treatment: Friction with ung. cinerium hydrarg. (33 per cent. metallic mercury), 3 grammes per diem., continued as long as signs of syphilis are present. Pot. iodidi sometimes given.

British.—Not admitted unless special complications. Do duty as a rule, no ill-effect. Restriction was in some cases placed on men as to leaving barracks. Treatment.

Hutchinson's pill (hg. gr. ii.) three or more times a day. Treatment continued for at least six months. Pot. iodidi sometimes given.

French.—All admitted. Treatment: Mercury by mouth in slight cases, injection bichloride of mercury in severe cases.

German.—All admitted. Treatment: Inunction and injections.

Italian.—All admitted. Treatment as for primary syphilis. Duration of treatment about two months.

Japanese.—No cases.

Russian.—All admitted. Treatment: Intra-muscular injections of salicylate of mercury.

Soft Chancre.

Please Answer as for Primary Syphilis as far as it Applies.

American.—Not admitted unless complicated. Treatment: Cauterisation, pure carbolic, iodoform.

Austrian.—Not admitted unless complicated. Do "light duty." No ill-effects. Same restrictions as for primary syphilis. Treatment: Cup. sulph. and iodoform, sometimes thermo-cautery.

British.—In 1903 mostly admitted. Since then not so often admitted; but I am inclined to think outdoor treatment increases tendency to buboes. Treatment: Iodoform locally.

French.—All admitted into hospital. Iodoform and calomel locally.

German.—All admitted. Iodoform, dermatol.

Italian.—Nearly all as out-patients. Of twenty-six, only four admitted; seventeen cases of buboes as complication. Mostly treated outside, with "light duty." Men not permitted to leave barracks. Treatment: Caustic, &c.

Japanese.—No cases.

Russian.—All admitted. Treatment: Iodoform locally, &c.

Gonorrhœa.

Same as for Primary Syphilis; but especially say how long you consider it should be kept under Treatment?

American.—About 10 per cent. of the Command has gonorrhœa. No uncomplicated cases are admitted. Treatment: Liq. potassii and hyoscyamus for ten to fourteen days, then injection zinc sulph., &c., with irrigation in special cases, with pot. permang. Time of treatment, six weeks.

Austrian.—Only admitted if much adenitis. Do duty; no ill effects. Restriction as for primary syphilis. Treatment: ½ per cent. protargol gradually increased in strength, later zinc sulph., alum and carbolic acid. Time of treatment, first infection, thirty to forty days; repeated infection, twenty-eight days.

British.—All admitted. Treatment: Confined to bed. Milk diet, barley water, weak warm solution of potass. permang. Time of treatment, sixteen days.

French.—Not admitted unless complicated. They attend hospital, and are excused duty and are not allowed to leave barracks. Treatment: potass. permanganate solution 1 in 4,000 as an injection. Duration of treatment, three weeks to a month.

German.—All admitted. Treatment: Injection of solution of protargol, 2·5 grammes to 1,000 water *ter in die.* When no gonococcus in discharge then injection with sulph. of zinc. Time of treatment, three to four weeks.

Italian.—Eighteen treated outside; seven admitted. Those treated outside not permitted to leave barracks. Treatment: pot. permanganate. Duration of treatment, fifty days.

Japanese.—One case under treatment for twenty-one days.

Russian.—All admitted. Treatment: Injections of solution of pot. permanganate and silver nitrate; acute cases, copaiaba and sandal-wood oil. Duration of treatment one month.

A NEW METHOD OF CHARGING BUNSEN BATTERIES FOR X-RAY WORK.

By Captain M. C. BEATTY.
Royal Army Medical Corps.

These batteries being commonly used in stations in India where it is impossible to charge accumulators, any method of simplifying their working may be of benefit to those employing them for X-ray or other work, and therefore a description and comparison of the common and new methods is given.

Common Method.

Technique.—The porous pots are charged with nitric acid (con.), the zincs having been amalgamated with mercury and placed in the containing jars, the latter are then charged with sulphuric acid (dil.) to the same height as the acid in the porous pots.

Disadvantages.

(1) The battery requires to be charged and worked in the open air on account of the strong nitrous fumes given off.

(2) The wasteful consumption of zinc by the sulphuric acid.

(3) The necessity of repeated amalgamation of zinc.

(4) The rapid deterioration of porous pots by action of the sulphuric acid.

New Method.

Technique.—(1) Wash a few crystals (two or three ounces) of potassium bichromate in water, drain and place in a glass funnel.

(2) Filter the nitric acid (con.) through these crystals (which after washing and drying can be used again) into the porous pots.

N.B.—This process of filtration need not be repeated with the same acid.

(3) Charge the containing jar with ammonium chloride (saturated solution) to the same height as the nitric acid.

Advantages.

(1) The battery can be kept in the X-ray room, as there is a total absence of nitrous fumes until the acid is nearly exhausted, which will not be for about two hours after starting.

(2) Consumption of zinc is reduced to a minimum.

(3) No need for the tedious process of amalgamation.

(4) Porous pots last very much longer.

(5) Cheaper, as there is not the constant outlay for mercury and sulphuric acid.

After use the acid should be replaced in loosely stoppered bottles, and used again until a total of about one and three-quarter hours of active work has been taken from it, after which it should be thrown away. The ammonium chloride solution can be kept indefinitely, a few crystals being added occasionally to keep it saturated. Zincs, porous pots and carbon blocks are washed in warm water and allowed to dry. The volts and ampères of the battery remain the same as in the common method.

N.B.—The zincs if they have been previously used with sulphuric acid should be thoroughly scoured with sand to remove any old mercury and zinc sulphate before placing them in the ammonium chloride solution.

The common method has been in use in India for some time, but it was such a lengthy process getting the apparatus in working order, and such disagreeable and troublesome work charging the battery with strong acids, and fixing it up in an Indian sun outside the X-ray room, that there was very little inducement to do many cases. Now the apparatus can be comfortably started, using the new method, inside the room in about ten minutes.

KALA-AZAR.

BY LIEUTENANT J. C. MCKENZIE.
Royal Army Medical Corps.

Two cases of kala-azar have been admitted to my wards in the Station Hospital, both belonging to the 2nd West Riding Regiment.

While at Lebong in May and June, 1905, I had another man of the West Riding Regiment in my ward suffering from the same disease. This makes a total of three cases in this regiment during the year, and as the disease is slow and insidious in its earlier stages it is not unlikely that there may be other cases not yet sufficiently marked for diagnosis.

The 2nd West Riding Regiment is broken up into three detachments, stationed as follows :—Dinapore four companies; Dum-Dum three companies; Barrackpore one company. Men are constantly passing from one of these stations to another for various reasons, and the station at which the man is admitted to hospital or begins to have symptoms is not necessarily the station at which infection was acquired. Careful histories of these men have been taken and the attached table shows :—

(1) Station at which infection acquired.
(2) Symptoms.
(3) Result of splenic puncture.
(4) Results of cultivation experiments.

The incubation period is uncertain but is probably of considerable duration. One of the cases now in hospital here had been two months in a hill station (where infection is highly improbable) before symptoms appeared. Two of the cases were infected at Barrackpore and one at Dinapore, or possibly at Lucknow.

With a view to finding out whether or not the disease is endemic among the natives at Dinapore, a number of native children were examined and all cases of enlarged spleen encouraged to come up to the Cantonment Hospital for treatment. It soon became apparent that the disease exists among the natives here to a considerable extent, and already I have four certain cases and a number of probable cases under observation. From one of these, Gurna, a boy, aged 12, Leishman bodies have been recovered by splenic puncture and motile flagellates cultivated from them. One of these natives was infected at a place ten miles from Dinapore, and the others were infected inside the cantonment. One advanced case

states that his brother recently died of the disease, while another case is in the last stage of emaciation.

The chronic nature of the disease and the great difficulty of recognising it in its earlier stages, are shown by the fact that cases which have come under observation during the past eighteen months have been variously diagnosed as enteric fever, dysentery, hepatitis, malarial cachexia, and debility.

Laboratory apparatus has been prepared for the cultivation of the Leishman body, and it is hoped, by culture experiments and the thorough examination of the houses and surroundings of the patients, to obtain fuller knowledge of the life history of the parasite and, if possible, of the method of infection. The fact that this disease, now recognised as a cause of invaliding among the troops, and almost invariably fatal, has now been found to be endemic among the native population at Dinapore, has seemed to me to call for the submission of a special report.

CASES OF KALA-AZAR IN THE 2ND WEST RIDING REGIMENT.
(*Stationed at Dinapore, Dum-Dum and Barrackpore.*)

Name	Station at which infection acquired	Symptoms	Result of splenic puncture	Cultivation experiments	Remarks
Private Evans ..	Barrackpore	Irregular temperature; enlarged spleen, wasting and anæmia; œdema of ankles	Leishman bodies found	Motile flagellates in large numbers on 3rd and subsequent days of cultivation	Now at Lebong.
Lance-Corporal Crawford	Dinapore (? Lucknow)	Irregular temperature; enlarged spleen; persistent diarrhœa; wasting and anæmia	Leishman bodies found	Multiplication, enlargement & vacuolation of parasites; cultures contaminated after 48 hours	Now at Dinapore.
Private Calvert..	Barrackpore	Admitted in advanced stage. Temperature sub-normal, pulse weak, skin cold and clammy; spleen very large; severe diarrhœa; wasting and anæmia	Leishman bodies found	Motile flagellates in large numbers on 3rd and subsequent days of cultivation	Now at Dinapore.

Note.—All these cases have been invalided to Netley Hospital.

Editorial.

WITH reference to the correspondence in the January number of the Journal, which appeared under the heading of "The Possible Infection of Man with *Micrococcus melitensis* by Goats' Milk," the following facts in connection therewith have since been gathered by us:—

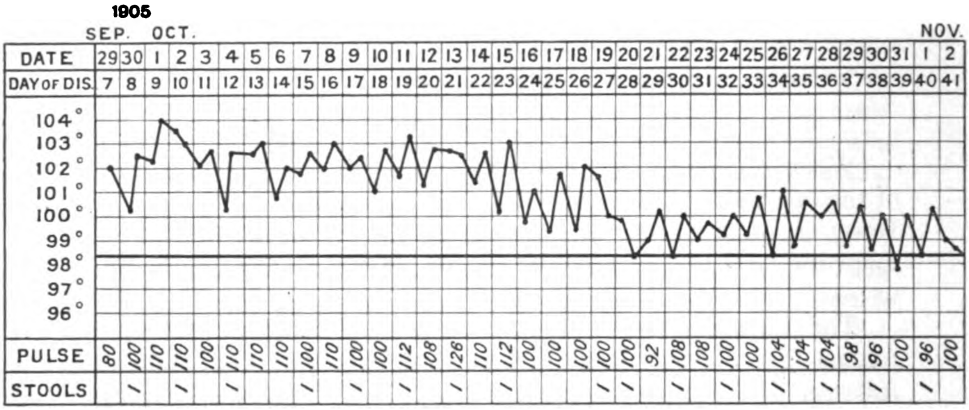
The Captain states "the s.s. 'Joshua Nicholson' left Malta August 19th, 1905, arrived Antwerp September 2nd, 1905, left Antwerp for London September 20th, 1905. Duration of stay in London nine days. Left London for Odessa, October 1st, 1905, *via* Gibraltar, Malta and Alexandria. Swartier was landed at Greenwich sick, September 22nd, 1905; F. D. Jenkins at Alexandria, October 21st, 1905. The chief engineer, chief mate and myself were all ill with 'fever' on board the ship for six weeks."

With regard to the man Swartier, who was admitted into the Dreadnought Hospital, Greenwich, we are, through the courtesy of Sir Dyce Duckworth, under whose care he now is, able to give a short history of the case, with temperature charts, &c.

Swartier states that all the members of the crew drank the goats' milk, that one goat died on the voyage, and a *post mortem* was made by a Mr. Thompson of the Department of Agriculture, Washington (the gentleman under whose care the goats are said to have been conveyed to the United States of America), but no cause for its death was found, and that at Antwerp fourteen of the crew were transferred to a steamer *en route* to Buenos Ayres, but the master, mate, three engineers, carpenter, cook, donkey-engine man, and Swartier himself, remained on the s.s. "Joshua Nicholson."

The patient Swartier states that this is the first long illness he has had, that he was the first one to be taken ill on board, and that his illness came on suddenly seven days before his admission to the Dreadnought hospital, *i.e.*, September 22nd, or thirty-four days after leaving Malta.

At first it was regarded as a case of enteric fever, the symptoms being continued fever, diarrhœa, and dried, furred tongue, but with a pulse rate higher than one generally gets in enteric fever. No spots were noticed and no enlargement of spleen. Other symptoms were pain and swelling of left ankle and pain in left shoulder, and lumbar pain was a marked feature of the case.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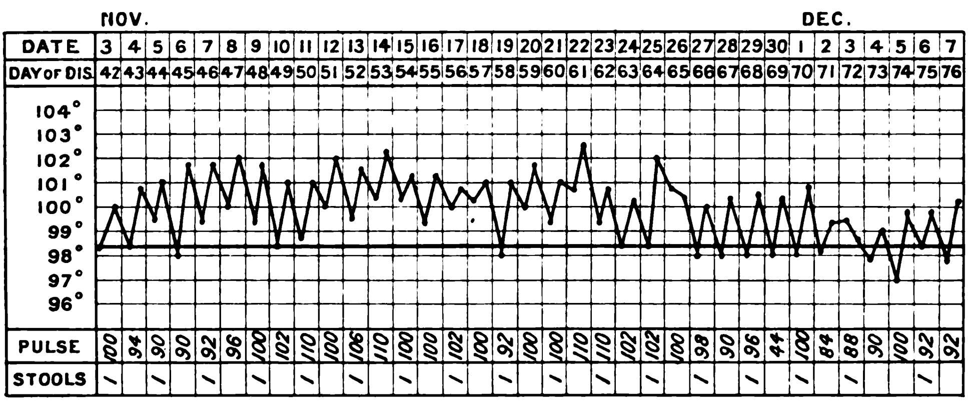
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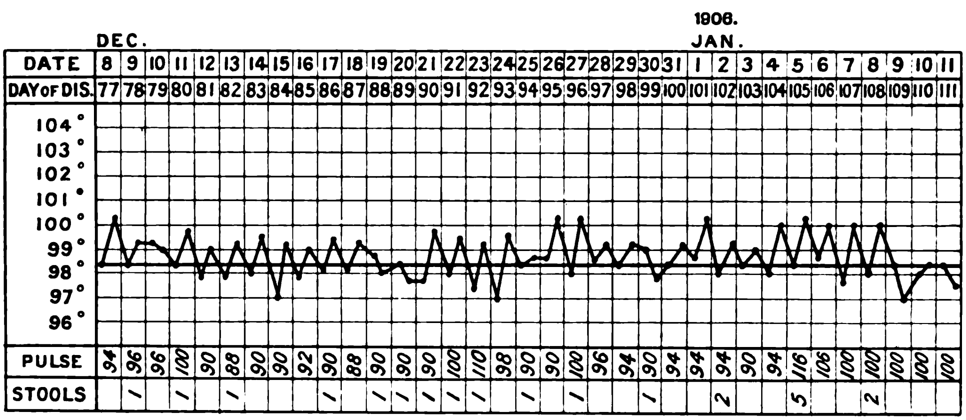
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A sample of blood was sent to the Lister Institute and was reported to give the Widal reaction for enteric fever. But later, when it was suggested that the case might possibly be one of Malta fever, another sample of blood was submitted to the same institute, and was reported to agglutinate with *M. melitensis*.

The man has now been in hospital 116 days, and is progressing towards recovery.

An examination of the blood taken on January 16th, 1906, was made by Lieutenant-Colonel C. Birt, R.A.M.C., who reports as follows:—

"Swartier's blood reacts to *M. melitensis*, which has been proved by no clumping being evident in 1 in 10 normal human serum; 10, 20, 40, 50, complete; 100 very nearly complete; 150 well marked; 250 faint trace.

"His blood does not react to the *B. typhosus* in a dilution of 1 in 25. He has, therefore, or has had, Mediterranean fever."

A sample of blood was also examined by Captain D. Harvey, R.A.M.C., who reports that it reacts to Malta fever.

One in 10, complete in a few minutes; 1 in 20, complete in a few minutes; 1 in 50, complete in an hour; 1 in 100, complete in twenty-four hours; 1 in 200, trace; 1 in 1,000, nil; control nil.

We hope to be able to publish some further information on this very interesting subject, when answers are received to letters which have been sent to various people concerned and interested.

Clinical and other Notes.

HAMMER-TOE AND HALLUX VALGUS.

By Captain J. H. P. GRAHAM.
Royal Army Medical Corps (M.).

The ætiological theories usually advanced to explain this deformity do not seem entirely satisfactory. There is an alleged hereditary predisposition to the condition, both gouty and rheumatic taint being asserted as predisposing causes, while all agree that an ill-fitting boot is an essential cause. It is of course as impossible to disprove the operation of a predisposing constitutional or hereditary cause in this case as to prove it, but there does not appear to be any connection between the condition and true rheumatism (acute polyarthritic synovitis), though it may be related to certain essentially chronic arthritic conditions often mis-called rheumatic. The essential or determining cause is no doubt a purely mechanical one, and in the vast majority of instances is brought into operation through the medium of an ill-fitting boot. The exact *modus operandi* is, however, not thoroughly explained and remains somewhat vague and conjectural. It is generally inferred that the initial change consists in a pushing back of a small toe by a short boot, that the toe is doubled up in order to accommodate its length to that of the boot, and permanent contraction results.

The contention here is that the deformity of the second toe (the one most often affected) is secondary to and dependent on a deflection outwards of the great toe at the metatarso-phalangeal joint in all but quite exceptional instances, and that the influence of an ill-fitting boot is brought to bear primarily on the great toe and only indirectly on the smaller toe. In other words, the great toe actually causes the displacement of the second, the deflection of the former is not a secondary process to fill in the gap, so to say, left by an initial drawing up of the latter. By the greater tendency in some subjects to these deformities, an inherited predisposition may be argued, and if accepted it seems most reasonable to ascribe it to the clinical group under the head of Arthritis Deformans, since in this is found deflection of the digits as a very constant feature. When examining a case of hammer-toe, the striking features are the contraction of the second and the deflection of the great toe towards the mid-foot line. The great toe, however, is not merely deflected outwards; with the foot flat on the ground it will be seen that to a variable extent its ungual phalanx overlies that of the adjacent toe, in some cases to such an extent that it entirely conceals it. In this

manner the terminal phalanx of the second toe becomes twisted on its own axis, which is the first stage towards the complete deformity. The pressure exerted on the terminal phalanx by the great toe, causes the hyper-extension at the metatarso-phalangeal joint and flexion at the first inter-phalangeal joint of the second toe, for being thus fixed at its end and unable to extend in walking or rising on tip-toe, it is obliged to permanently adopt a cramped position. The deflection of the great toe is usually progressive until it eventually touches the tip of the third toe, the point of the second is then embraced by the others and doubled under to an extent which causes the nail in extreme cases to press on the ground rather than the pad, the nail becoming worn away and its bed ulcerated. The corn and bursa which develop on top of the first inter-phalangeal joint indicate the only spot on which the pressure of the boot directly falls on the digit at any time. These points are easy of demonstration, even in quite early stages, in feet thus affected, and the altered position of the toes in walking and rising on tip-toe, owing to the abnormal position of the great toe, are readily appreciated. The deformity, once started, is aggravated by contraction of the lateral ligaments, a change not however peculiar to the deformity under consideration, but which belongs to the general pathology of contracted articulations. In some cases of Hallux Valgus it is found that the second toe, instead of being doubled up, lies upon the top of the great and third toes; here it would appear that instead of overlying it, the great toe, as it became deflected, has pushed the second toe up out of the way. Stiffness at the metatarso-phalangeal joint (Hallux Dolorosus) is common in these instances. What it is that actually determines the alternative in displacement it is difficult to say, but the longer the toes and flatter the foot, the more likely is the second toe to overlie the others than be doubled up by them. With regard to remedying the deformity, the first thing to do is, in early cases, to attempt to stop the deflection of the great toe. It will not suffice simply to attend to the fit and shape of the boot, but an apparatus must be worn which exercises a pull on the great toe away from the mid-foot line, and efforts made to forcibly straighten the second toe. By these means the normal positions may be restored, but in advanced cases division of the lateral ligaments and excision of the head of the first phalanx of the second toe is required.

Since walking and other exercises on foot aggravate these deformities, and since treatment by mechanical means or operation is tedious, men offering themselves for enlistment with tendencies towards the condition, should be submitted to a most careful examination before being accepted.

It is constantly noticed that men who when standing with their feet flat on the ground present a moderate degree of hammer-toe will, on attempting to rise on tip-toe, exaggerate the deformity very greatly, much as they may try to avoid doing so.

REPORT OF A CASE OF FRACTURE OF THE SKULL.

By Major F. J. W. PORTER, D.S.O.
Royal Army Medical Corps.

The following case appears of interest as showing how trivial a scalp wound may, when associated with a fracture of the skull, cause death fnom meningitis.

Private M., 2nd Norfolk Regiment, was admitted to the Military Hospital at Colchester on April 1st, 1905, with a small suppurating scalp wound over the frontal bone to the right of the middle line and close to the coronal suture. His temperature was 101·6° F. The wound was scarcely ¼ inch in length. A probe touched bare bone, but no fracture could be felt. He had several small abrasions on his face, and it was for these that he reported sick. The scalp wound he did not display until after he had been admitted. He stated that he had been struck on the head by a military belt buckle on March 26th.

April 2nd. This morning he complained of severe headache. Temperature 99·4° F.

April 3rd. There was œdema of the right eyelid and of the scalp on the right side as low as the zygoma. It was thought that he probably had some pus beneath the aponeurosis. He was put under chloroform and the wound was explored. No pus was found, but a tiny fracture was found about ½ inch long, in the frontal bone immediately beneath the site of the scalp wound, and a fragment of fibrous tissue was tightly gripped by the edge of the fracture. There was a very slight depression at the upper part of the fracture. As, up to this point, nothing had been seen to account for his cerebral symptoms (which by this time had become acute) it was thought advisable to raise the disc of bone in which the fracture existed. This was done, but the inner table appeared normal. The dura mater was apparently normal. The brain pulsated very feebly when the dura was incised. The flaps were replaced and a drainage tube inserted beneath them.

April 4th. Headache intense. Much vomiting. Ten grains of calomel were given and one drachm of potassium bromide was ordered every two hours. Temperature 103·4° F. As the bromide was rejected, small doses of morphia were given at intervals, so as just to relieve the headache.

April 5th. Temperature 102° F. Delirium at times. Bowels not open. Still vomiting and headache severe. Scalp wound looks healthy; very little discharge. Œdema of face less. Suspicious weakness of left side of face.

April 6th. Temperature 101·8° F. Marked paresis of left side of face and body. Tongue protruded to left. No knee jerk. Left side very slight plantar reflex, and leg is slightly moved when sole is tickled. Vomiting continues. Patient lies on his back in a drowsy condition,

but is quite rational when spoken to. Two minims of croton oil acted well. Scalp wound looks healthy. Œdema of face has almost disappeared. Has full control of bladder and asks for the urinal.

April 7th. Has complete paralysis of left side. Under morphia lies asleep most of the time. Quite rational when roused. Vomiting has ceased.

April 8th. This morning I trephined over upper part of fissure of Rolando, right side. The dura bulged considerably and pulsated very feebly. When dura was incised clear fluid spurted out with great force. This rapidly became turbid and soon pus flowed. It came from the upper part of the skull. Flaps replaced and drainage tube inserted between brain and dura reaching as high as the first trephine hole. Upper part of wound sealed with collodion.

April 9th. Yesterday afternoon patient was quite rational and free from headache when kept still. Free drainage. Temperature 102° F. This morning headache is again severe. Tongue is protruded straight.

April 10th. Headache became more intense and patient died at 7.30 p.m.

Post mortem 10 a.m., April 11th, 1905.

No sign of any other wound of scalp. Skull thinner than normal. Tissues round trephine wounds look healthy. No suppuration beneath aponeurosis. Slight amount of lymph over outer surface of right side of dura mater near longitudinal sinus. Considerable amount of lymph over whole of right half of cerebrum. Left half appeared normal, except for the intense congestion of the blood vessels. Base of brain appeared normal and no fracture was seen. The most intense changes appeared to be over the right motor area.

I think there can be no doubt that meningitis had commenced when he was admitted to hospital on April 1st. The first trephining was done on April 3rd, and through a suppurating scalp wound. The question was raised by some who saw the case that possibly the meningitis which ended in his death resulted from this trephine wound. The pus which was evacuated through the second wound was pent up under very great pressure, and I think it would have had no difficulty in escaping through the first trephine wound if suppuration had started at that site.

I have referred the history to one of the consulting surgeons to King Edward VII. Hospital. He replied as follows:—"I cannot see any reason to suppose that the first operation caused the meningitis."

A CASE OF ABSCESS IN AN OLD HERNIAL SAC, ACCOMPANIED BY AN INTRAPERITONEAL ABSCESS, CAUSING INTESTINAL OBSTRUCTION, AND SIMULATING A STRANGULATED HERNIA.

By Captain E. P. SEWELL.
Royal Army Medical Corps.

Private S., 1st South Wales Borderers, was admitted to the Station Hospital, Mian Mir, on February 25th, 1904. He had been sent in from an out-station, where it was impossible to render him surgical assistance. The following history was given:—He had suffered from a rupture, and had been fitted with a truss in July, 1903. This, however, he did not wear regularly.

The rupture frequently came down, but he was able to reduce it, until about a month previous to his admission to hospital, when it came down, and has remained down since, in spite of his efforts to reduce it.

On February 14th he was admitted to hospital suffering from dysentery. He had pain in the abdomen, chiefly in the epigastric region, and was passing frequent stools, consisting of blood and mucus. The temperature was a little raised. He was treated with magnesium sulphate, and the dysentery ceased in five days. Some tenderness, however, remained in the right iliac fossa, and some resistance was felt there, like a coil of distended intestine. His bowels became confined, and on February 23rd abdominal pain was again complained of, on this occasion chiefly in the right iliac region. The swelling in the inguinal region (which the patient had not previously mentioned) was now, for the first time, noticed. It occupied the situation of, and was diagnosed as, a right direct inguinal hernia. An attempt was made to reduce it under chloroform, and this failing, he was sent to Mian Mir.

On arrival he looked pale and somewhat exhausted. His tongue was furred, and his temperature 100° F. He complained of pain in the right groin, and lay in bed with his legs drawn up. On examination, a pyriform swelling, about 3 inches long, was found occupying the right side of the scrotum, and extending up the cord to the external abdominal ring. The swelling was hard, tense, and very tender, and the skin over it was hot and reddened. There was some fluctuation, but it was not translucent. There was no impulse on coughing. The testicle lay below and behind the swelling, which occupied the site of a direct inguinal hernia. The condition appeared to be one of inflamed and irreducible epiplocele, with effusion of fluid into the sac.

It was decided to perform a radical cure as soon as the inflammation had subsided. An ice bag was applied, and the foot of the bed raised. The bowels were opened by an enema. On the two following days the condition remained the same. The temperature kept up, the highest

reading being 102° F. The bowels were opened naturally twice each day.

On February 28th the patient complained of pain in the abdomen. The latter was distended and tympanitic. The bowels were confined, and he was unable to pass flatus. At 10.30 p.m. he began to vomit and hiccough. The pulse was rapid and small. In view of these symptoms, which indicated strangulation, it was decided to operate immediately. Assistance was therefore summoned, and the operation immediately commenced at 1.30 a.m. The patient was anæsthetised, and an incision made over the upper part of the swelling. On cutting down and opening the sac, the walls of which were very thick, a quantity of thin purulent fluid escaped. A finger inserted into the sac reached upwards as far as the external abdominal ring, and downwards as far as the bottom of the scrotum. There was no omentum or intestine in the sac, and there was no communication between it and the abdominal cavity. The sac was cleansed and drained, and the wound closed. It was thought possible that the irritation caused by the abscess might have induced the symptoms, and that it would be better to await developments before doing anything further.

On the following days the patient's condition did not improve much. His bowels were open twice, and he felt more comfortable. Pulse 90° F. Temperature subnormal. Respirations 20. The vomiting, however, continued.

On March 2nd the patient complained of great pain in the abdomen; the bowels were confined, and an enema had no result. The vomiting continued, and was of a bilious character.

On March 3rd the symptoms were similar but more aggravated, the vomiting and hiccough were severe, and the vomited matter was brownish and had a fæcal odour. It was brought up in small quantities of an ounce or two at a time. The urine was scanty; pulse 116, small and wiry. The condition now appeared to be one of obstruction, due probably to inflammation spreading from the abscess to the general peritoneum, and causing peritonitis and adhesions, under a band of which the intestine had become strangulated. With the object of removing such a cause of obstruction, if present, an exploratory laparotomy was undertaken. The abdomen was opened in the middle line below the umbilicus, and the iliac regions explored. The coils of intestine that came in sight were much distended and inflamed. There were many recent adhesions between coils and between the intestines and the parietal peritoneum. There were none discovered, however, of sufficient strength to cause strangulation. There was no hernia.

The patient's condition had now become so serious that further measures were impossible. The peritoneal cavity was, therefore, flushed out, the wound closed, and the patient returned to bed. Restoratives were applied, and the patient recovered from the collapse. But the

symptoms of obstruction continued, and he died twelve hours after the operation.

Post-mortem appearances.—On opening the abdomen the small intestine was found to be greatly distended with gas and fluid. The large intestine was empty. There were well-marked signs of peritonitis over the lower part of the abdominal cavity. The peritoneum was red and injected, and the great omentum was closely adherent to the brim of the pelvis. There were numerous adhesions between coils of intestines, and the cæcum and vermiform appendix were firmly bound down to the abdominal wall. The vermiform appendix appeared healthy. At the brim of the pelvis the intestines were closely matted together, and on separating them, an abscess containing about 4 ounces of creamy, greenish pus, was discovered, lying in a cavity formed by the adherent coils of small intestine. The abscess was in contact with the upper part of the rectum. There was no palpation of the intestine. On opening the intestines, no ulcers, dysenteric or other, were found, and there was no perforation. The liver and spleen were enlarged.

Remarks.—The interest of the case lay in its strong resemblance to a case of strangulated hernia. All the general symptoms pointed to intestinal obstruction, while the local condition resembled a hernia. The history, too, of a hernia having previously existed, gave support to the view that the condition was one of strangulated hernia. The causation of the intraperitoneal abscess was also a matter of interest. The dysentery, which was apparently the beginning of his illness, might be supposed to have been the exciting cause. But in the absence of any signs of ulceration or perforation, it seems more probable that the abscess, involving, as it did, the rectum, was the cause of the dysenteric symptoms. In this case the abscess in the pelvis may have been secondary to the abscess in the hernial sac, either by a spread of inflammation along the peritoneum, or more likely by actual leakage from the abscess into the general peritoneal cavity, the leak becoming obliterated subsequently by adhesions.

Translation.

THE MEDICAL SERVICE OF THE ITALIAN ARMY.[1]

After the capture of Rome in 1870 Italy became united and the Italian Army was reorganised. Though the north-east was comparatively easy of defence on account of its alpine character, the configuration of the country as a whole was not in favour of rapid concentrations, and the disproportionately great sea board of 2,800 kilomètres increased the vulnerable points. A powerful navy was set to guard the coast, and a strong alpine corps, strong even on a peace footing, was provided to take charge of the mountain frontiers. The burden of conscription was made as light as possible, mobilisation being made regional; most of the army corps were disposed in the north, whilst the remainder were placed along the chief lines of communication. The resulting organisation is well devised, simple and vigorous, and yet not too costly.

The country is divided into twelve districts for army corps, each including two divisions. Sardinia forms a special command, the 25th Division, being attached to the 9th Army Corps (Rome). The Army Corps are as follows: 1st Turin (Novare), 2nd Alexandria (Coni), 3rd Milan (Brexia), 4th Genoa (Placentia), 5th Verona (Padua), 6th Bologna (Ravenna), 7th Ancona (Chieti), 8th Florence (Leghorn), 9th Rome (Perovia and 25th Division of Sardinia), 10th Naples (Salerno), 11th Bari (Catauzaro), 12th Palermo (Messina).

Generals commanding Army Corps act territorially, having control of the troops and military establishments in their district. Generals under these command only infantry.

The Artillery and Engineers do not conform to the aforementioned subdivisions, but are grouped into separate commands, the generals in charge of which are responsible directly to Inspectors-General of Ordnance. The Medical and Army Service Corps have a regional organisation and are represented in each army corps by Directors-General.

For the purposes of recruiting, the country is divided into three great zones, upper, middle and lower Italy, and into 88 military districts subdivided according to the density of the population; 82 of the areas yielding one infantry regiment apiece, the 6 others yielding two regiments.

[1] Translated from the Article by F. Antony, Professor in the Val de Grace, Medecin-principal 2nd Cl., in the *Archives de Médecine et de Pharmacie Militaire*, 1904.

The districts are grouped in pairs and furnish reservists to the territorial Infantry Brigade.

To forward national unity the annual contingents of recruits of each of the three great zones furnishes an approximately equal number of recruits, and every four years infantry brigades are drafted to different garrisons. They pass from one zone to another and remain four years in the districts from which they were originally intended to draw their recruits. Through this arrangement the recruiting becomes national, whilst the mobilisation of reservists is regional.

The Alpine troops are recruited from the 22 conscriptional areas of the frontier (northern) zone, and therefore territorially. At the head of each district a colonel or lieutenant-colonel is placed, who disposes of all questions affecting recruiting and mobilisation.

In peace time the effective strength of the army varies with the time of the year. From September to the middle of March it is reduced to 173,000 men; during the remainder of the year it reaches 256,000 (1901).

On an average there are 13,462 officers, 3,830 artificers, and 213,000 men with the colours, of whom 24,000 are carabinieri or gendarmes. The army consists of 115 Infantry regiments, 12 of which are Bersaglieri, and 7 Alpine regiments, all told 346 battalions. There are 24 cavalry regiments of 6 squadrons each, 4 heavy and 6 light lancer regiments and 14 of light horse; 26 regiments of artillery of which 12 are corps artillery, 12 divisional, 1 of horse, each of 8 batteries, 1 mountain artillery regiment of 12 batteries, also a group of 3 in Venicia; 78 companies of coast and fortress artillery forming 6 regiments, and 6 companies of artillery artificers; a brigade of 5 regiments of sappers and a brigade of 6 companies of railway engineers, 12 companies of sanitary (Medical) corps, 12 companies of commissariat (Army Service) corps.

Service is personally obligatory and lasts from the 1st of January of the year in which the man attains his 21st year, to the 31st December of the year in which he is 39 years of age. The service is eight years in the standing army—three years with the colours, and the remaining time on unlimited leave. The next four years are passed in the mobile militia, and last of all, from the 12th year, in the territorial militia for seven years.

The whole contingent of recruits does not accomplish three years of service actually, with the exception of non-commissioned officers, who complete three years; cavalry alone serve three years. Most recruits serve a shorter time if they pass into the first class. Men who have engaged voluntarily serve one, three or five years with the colours. These differences are governed by the state of the national exchequer. Recruits are called up at different times of the year: for cavalry in November and December, whilst the other branches are only called up in the March of the ensuing year. For the same reason the militia

training has a variable length dependent upon financial considerations. Recruiting is conducted as follows:—

The process lasts nearly throughout the year. During January the list is prepared by the Mayor of each Commune and is checked by the Municipal Council. Drawing of numbers takes place in April and May under the Commissioner of Levies, who rejects the visibly deformed and those who are below 5 feet 1¾ inches (1·54 metres) in height.

From June to October the "Inscribed" men are called up before the Councils of Levies; after examination they are either admitted, adjourned or exempted. Those men who consider themselves suffering from infirmities unfitting them for service may be authorised to undergo examination by the Council of their locality. In October the Prefects and under-Prefects, with the Commandant of the district, verify the list of the local contingent and divide the men into two categories.

The War Minister determines ultimately how many men of such class are to serve three, two or one years.

From November to March recruits attend at the office of their district, where they are examined by a medical officer in the presence of the Commandant of the district and of officers representing different branches of the service. The latter choose the numbers they require and take them to their destinations. The suitability for different kinds of service are settled at once. Those who are unfit for military service are eliminated and go before a "reform" commission. "Inscribed" men whose services are legally dispensed with form the third class of the contingent and pass into the territorial militia; they are only called up for very short periods of training.

Men exempted on account of infirmities are not entirely liberated, as the Minister for War can, during the two following years, have them re-examined.

Students who, before the drawing of lots, engage to serve in the first category of the contingent may obtain leave extensions up to their 26th year. Those who voluntarily engage for one year pay 1,200 lires (£48) in the infantry and 1,600 lires (£68) in the cavalry.

The population of Italy is over thirty-two millions. The number of "Inscribed" men reaches annually 300,000 to 315,000 men; to this number must be added the 90,000 "Adjourned" men of previous years. In 1900 the Councils of Levies only actually examined 387,444 men in consequence of the non-appearance or disappearance of 27,000 "Inscribed" men. Of these 76,684 were exempted; 92,763 were adjourned; 86,253 received dispensation; 92,376 were declared fit. Besides these, in that year 4,325 engaged voluntarily and 1,325 for one year; 33 per cent. of the "Inscribed" were illiterate. The lowest standard of height is 1·55 metres.

It was estimated in 1901 that the Italian Army could mobilise 3,330,000, consisting of:—

Active Army 734,000 (486,000 on continued leave); Mobile Militia 320,000; Territorial Militia 2,275,000.

The number of trained men did, however, not exceed 1,200,000.

Medical Service at Home.

Military Medical Corps.

The Service consists of a Medical Corps, the organisation of which is analogous to that of other armies and to the Services of the Italian Army, and which, under the generals and officers, enjoys complete autonomy. The Service consists of: (1) Medical Officers; (2) Sanitary Companies. Besides this there are sick attendants, regimental stretcher bearers, and in the hospitals dispensers and paymasters.

(1) *Medical Officers.*—The officers have effective rank. Their titles are assimilated to those of other departments: Commissariat, Veterinary and Accountant. Their work is limited to that of their department, and their command does not extend to other branches. They have the same standing as other branches, but with compound titles, *e.g.*, Colonel-Surgeon, Captain-Surgeon, &c. No prerogative enjoyed by other officers is withheld, not even the presidency of a Council of War.

Medical students may, if they desire, submit themselves to general conscription and then pass through the ranks as ordinary privates, &c. When they have become qualified, *laureati in medicina e chirurgia*, they become medical supernumeraries, provided they have passed a qualifying examination. During the two years following upon their nomination they serve for three months.

Generally students fit for service receive, on application, extensions of leave to enable them to complete their studies. Having passed their professional examinations they are all, without exception, called up in November in each year to attend the school of military hygiene at Florence. Their title is now "student medical officers," and for eight months attend theoretical and practical courses of instruction; and after passing the examination become supernumerary sub-Lieutenant-Surgeons (reserve).

After one month's leave they perform one year's service with a regiment, at the same time taking part in the work of the garrison hospital. This period over, twenty to twenty-five of the best are chosen as surgeons in the active army. The remainder return to their homes on unlimited leave. They are registered as on the active army up to their 32nd year, and in the mobile militia up to their 39th, and even to their 45th year if they apply for this extension. Those of them who consent to undergo service for a few months and pass qualifiying examinations may receive the title of Lieutenant, and later Captain-Surgeon in the reserve.

In subjecting all the medical men to a uniform system of technical

instruction, the Italian authorities have been able to create a homogeneous medical corps, well fitted to fulfil its military obligations, and excellently devised to ensure proper working of the medical organisation in the field.

The effective strength of the corps has been reduced during recent years, whilst the higher grades of officers have been increased. A marked proportion of the sub-Lieutenant-Surgeons belong to the reserve.

The following table is of interest as showing the rates of pay, &c.

Rank	Strength	Pay in lires	Increase of pay every six years	Daily extra pay in the field	Allowance on taking the field	Age limit
Maggiore-general medico ..	3	9,000	—	10·00	3,500	65
Colonello..	15	7,000	400	6·00	1,500	62
Teniente-colonello	28	5,200	300	4·50	900	58
Maggiore..	74	4,400	300	4·50	900	56
Capitane..	278	3,200	300	3·50	600	53
Teniente	289	2,200	200	3·00	400	50
Sotto-Teniente		1,800	200	3·00	400	50

A minimum of six years' service is required of sub-Lieutenants and Lieutenants, before they can pass to a higher rank, eight for Captains, four for the higher ranks. To compensate for slowness of promotion pay is increased every six years, until it touches the pay of the rank immediately above.

Promotion goes by merit and by seniority, but no officer in the Italian army can be raised to a higher rank unless the step is warranted by good service, special scientific attainment, or, failing these, the passing of special examinations. Thus, the examinination for Maggiore includes a written, an oral and a clinical examination.

The written examination consists of essays upon a medico-legal question, and one on hygiene and military sanitation. The oral test of surgical questions and the performance of two operations on the cadaver. The clinical on medical, surgical, ophthalmic and venereal cases.

Upon the results of the examination, the rank of Captain or of Major may be conferred, and in the proportion of a quarter of the vacancies. Majors and Lieutenant-Colonels are elected to the higher grades by seniority, influenced by selection. Inspectors-General by choice only. Rank is marked by the number of stars on the shoulder-strap. One for sub-Lieutenant, two for Lieutenant, three for Captain. The shoulder strap for higher ranks is edged with silver cord, and bears one, two, or three stars, according to rank. The corps badge is the Geneva Cross on a white ground. The tunic is blue, with epaulettes, gray overalls with light blue stripe.

An advanced course of hygiene is conducted at the school in Florence; it lasts from October 20th to December 15th, and each year twenty

surgeons are selected for instruction. At its termination, the Director confers a certificate of proficiency, which is to be attached to the officer's record.

In every garrison the medical officers are expected to attend the scientific meetings held by the principal medical officer of the garrison. Those officers upon whom service tells prematurely are relegated to the auxiliary service. Thus officers prematurely aged and unfit for very active service are retired, Major-Generals at 55 years of age, Superior Officers at 52, Captains at 45, Subalterns at 42. The same rule is followed with officers, who make application, and who, for two years have been superseded in the list of promotions for seniority and selection. Such cases are dealt with by placing them as military medical experts on the Councils of Levies, territorial services, or on temporary duties.

(2) *Sanitary Companies.*[1]—Military sick attendants are grouped into twelve companies, one for each Army Corps, in addition to which there is a special company of forty-nine men for the island of Sardinia. The strength of each company varies from 116 to 390 men (116 at Ancona, and 390 at Naples). The total strength of the companies is 2,400, of which 225 are hospital aids, 736 sick nurses (hospital orderlies), 980 stretcher bearers, to which 400 auxiliaries are to be added from the line.

The greater proportion of the companies is attached to the principal hospital at the headquarters of the Army Corps.

Detachments are distributed in the other hospitals of the district. The company is commanded by the Captain-Surgeon, adjutant of the hospital, under the orders of the Principal Medical Officer or director of the hospital.

Recruiting for the sanitary corps occurs principally in the territory of the particular Army Corps. To it are attached: (1) One year voluntarily enlisted students of medicine and the young surgeons who have been licensed by the School at Florence; (2) the young men of the yearly contingent of recruits who apply; some, such as college students, pharmacists, druggists, who are to become hospital aids (*aiutanti di sanita*); others, such as hotel waiters, workmen, agricultural labourers, are trained as sick nurses or hospital orderlies (*infirmieri*); (3) a number of "registered" men are told off as stretcher bearers (*portaferiti*). The latter, in emergencies or on application, may be classed as *infirmieri* by the directors of the corps.

[1] Just as the title "medico" in the Italian, or "medecin" in the French, is hard to give in exact English, and is translated as "surgeon," so is the term "Sanitäts Detachment" in the German or "Compagnies de Sauté," equally wanting in an equivalent, though in the German Army it corresponds most nearly to the English "Bearer Company."

Recruits must undergo two months' general military training before being passed into the corps.

(3) *Regimental Hospital Attendants and Stretcher Bearers.* — In Infantry and Bersaglieri regiments the Medical Officers have under their orders a corporal assistant, who receives this step after three months' training in a sanitary company. This corporal is replaced biennially, and may rise to corporal-major. He instructs, and is chief of, the stretcher bearers; takes charge of the infirmary, and carries the haversack containing materials for first aid and dressings. In the field one infirmary corporal and eight stretcher bearers are attached to each infantry battalion.

In order that the supply of these auxiliaries may be assured, every year each company of a battalion designates two men to follow the courses of instruction which are organised in the summer. The same rule holds in the units of other corps to which stretcher bearers are attached in the field.

The medical organisation of the Alpine troops is more complete, since to each company are told off one sub-Lieutenant-Surgeon, one corporal and five *infirmieri.* The latter are recruited from the regiments and are hardy mountaineers. They are trained for six months in a sanitary company, take their turn in hospital duties, and attend courses of instruction on first aid specially devised for mountaineering emergencies. At ordinary times these men are employed on general duties, the corporal acting as a clerk and the men as pioneers.

(4) *Pharmacists.*—Military pharmacists are counted as civil employees with relative rank for purposes of precedence only. They must be under the age of 28 and have completed their military service, must possess the degree of doctor in chemistry and in pharmacy, or have the diploma of pharmacist. Admitted as pharmacists of the third class, after serving one year they undergo examinations and pass into the second class. In the same way examinations lead to the status of pharmacists of the first class and principal pharmacist.

This body consists of the following officials :—

Appointments.	Relative Rank.
1 Chemist Inspector	Lieutenant-Colonel
1 ,, Director	Major
12 Chief Pharmacists, 1st class.. ..	,,
4 ,, ,, 2nd ,, ...	Captain
Pharmacists, 1st class	,,
,, 2nd ,, ...	Lieutenant
,, 3rd ,, ...	Sub-Lieutenant

(5) *Accountants.*—In military hospitals, as well as amongst other bodies of troops and military establishments, pay and financial matters are entrusted to officers of the pay department. They form a special

corps, enjoying the usual privileges of officers. It is recruited from the non-commissioned officers of the Army and for certain ranks from combatant officers, to whom one third of the appointments are reserved.

The corps consists of the following :—

One Colonel, 12 Lieutenant-Colonels, 47 Majors, 336 Captains, 769 Lieutenants and sub-Lieutenants.

General Organisation of the Service.

Ministry of War.—The medical service is represented at the War Office by a sanitary council with whom the Minister for War consults. This council does not exercise direct command. Its duty is, on its own initiative, to study all questions affecting the amelioration of the sanitary service, and to bring them to the notice of the Minister for War.

The Inspector-in-chief (*ispettore capo*) presides over the council, and assumes the special direction of the central office of the *personnel* of the sanitary service in respect of its interior economy and its mobilisation. Two other Inspectors and Colonel-Surgeons are placed in charge of four other offices, of: (1) hygiene and statistics; (2) technical service and publications; (3) legal medicine and material; (4) chemistry and pharmacy.

The chiefs of offices exercise supreme control over their special departments and inspect them. They do not, however, exercise the right of adjudicating punishments, but are empowered to demand from their subordinates in their departments both military and technical reports of such a professional or scientific nature as they may require.

In reality there is no special direction of the sanitary service exercised at the War Office, and the members of the council have no direct or administrative authority over the *personnel*, these functions devolving entirely upon Generals of Divisions or of Army Corps.

Command in Army Corps.—The sanitary service is organised regionally under the immediate authority of the General Commanding the Army Corps. Each consists theoretically of a director's office and two principal divisional hospitals. The director is a Colonel-Surgeon, who exercises the authority of a brigadier over the *personnel* of his command. A Captain-Surgeon and a permanent secretary are attached to him.

He exercises technical and supreme surveillance over the medical service, under the general officer commanding. As regards the discipline of his men, the administration of the hospitals under his control and mobilisation, he is accountable to the Generals of Divisions. He may only inspect hospitals after being authorised to do so by his military superiors; he communicates directly with the chief sanitary council, and with his subordinates of the sanitary service on matters of a technical or statistical nature. He supervises the surgeons under his command, distributes, as needs dictate, the regimental medical officers, &c., in the

hospitals, and exercises general supervision and assiduous control. He organises the sanitary service for manœuvres and prepares it for mobilisation.

Control in Infantry Divisions.—Under the authority of the Genera of Division a Lieutenant-Colonel with the powers of a Corps Commander exercises technical administrative and disciplinary control in all the military and thermal hospitals situated in the divisional territory. He personally commands the principal divisional hospital. The director who is the Principal Medical Officer of the chief divisional hospital at the headquarters of the Army Corps is in addition charged with the command and adminstration of the sanitary company.

The Divisional Surgeon stands in the same position to the Sanitary Director of an Army Corps as the commanders of military units stand to the General of their respective brigades.

On subjects of administration and finance he corresponds directly with the Minister of War in the same way as other commanding officers of troops.

The regimental sick attendants are under his supreme authority, and like the surgeons are distributed in the local or neighbouring garrisons, with the exception of one attendant, who in principle assures for a week's tour of duty at a time attendance in the regiment. The whole divisional *personnel* is thus under the immediate orders of the Divisional Surgeon. The surgeons of principal and of attached hospitals are detailed by the Minister of War himself, whilst the Divisional Surgeon appoints to the commands of the smaller medical organisations both the surgeons and the paymasters.

Hospital establishments are divided into the following: chief military hospitals, attached hospitals, garrison infirmaries, *infermierie di presidio*, and special infirmaries, thermal establishments (baths), and convalescent hospitals.

Principal Military Hospitals. Command.—The Divisional Surgeon is director of the principal divisional hospital. The Captain Staff-Adjutant of first class acts as his aide and secretary. The former is quartered in the hospital if there is accommodation. He is chief of all the other hospitals in his division which are considered as attached hospitals. He distributes and keeps records of the *personnel*, and promotes to non-commissioned ranks. He is responsible for the conduct of the hospitals in their internal and external relationships, statistics and medical certificates. Under him the senior Captain-Surgeon holds the position of Staff-Adjutant; he is entitled the Senior Captain and distributes the duties according to seniority. In the latter are included the arrangements for the discharge of all the internal work in the hospital, administration, pay of staff and of the sanitary company, the necessary book-keeping and registers of admissions and discharges, &c., of patients.

Administrative Council of Hospitals.—The administration of all

military hospitals of the division is directed by a council, presided over by the Surgeon-Director of the division, the members of which are the two senior surgeons, the directing accountant officer acting as registrar, and another accountant officer as secretary.

The president of the administrative council makes requisition, through the "Office of Revision," on the Minister of War for the funds necessary for the carrying on the divisional hospitals. These requisitions are forwarded on two different forms, one for the pay of the *personnel*, the other for the treatment of the sick. The attached hospitals receive from the administrative council the money and material allotted to them in the same way as detachments of other units. The pay officer who acts as registrar keeps the records of pay and accounts, &c., of the divisional hospitals, in which he is assisted by other officers of the pay department; these are subordinated to him and are appointed by the Principal Medical Officer to take charge of all in- and out- goings and stores. Medicines are under the charge of a Director-Pharmacist, aided by pharmacists and male sick attendants. The director is under the orders of the Principal Medical Officer. His expenses are checked by the reporter to the council. The hospital *personnel* is composed of doctors, pharmacists, paymasters and their assistants, an almoner and sisters of charity (*religieuses*) acting as nurses.

The Service in the hospitals is divided into: (1) Attendance on the sick; (2) Corps duties.

Attendance on the Sick.—The sick are classed into the following divisions: (1) fevers; (2) wounded; (3) ophthalmic; (4) venereal; (5) contagious (isolated). The number of sick in each division varies from forty to eighty. The number of those suffering from fevers must not exceed sixty. The regulations fix a minimum of 30 cubic metres space and a floor area of 5 square metres to each patient. The offices of "treating officer" devolve upon the superior officers and Captain-Surgeons who attend the patients medically, several subalterns being told off as "assistants." Each division has besides a corporal of division, one or more "sanitary aides" and four infirmary attendants, one for ten or fifteen sick. The corporal of division and the inspecting sergeant are responsible that cleanliness is maintained. The sanitary aides prepare the sick (nosological) registers, upon which they enter the details of the case from each man's sick report on admission. They write up the visit (daily) registers in which are recorded prescriptions, treatment, &c., and have charge of materials for dressing, &c. The medical assistants attend the wards before the visits of the "treating officers," and acquaint themselves with all details so as to report to the former at their rounds. The times of the visits are fixed by the Principal Medical Officer, and all the prescriptions are entered both in the nosological and in the daily registers. Rations are of four degrees; ordinary diet consists of three meals: first dejeuner of milk or coffee, a second dejeuner and a dinner composed of

soup with bread or vegetables and a meat course. Special food can only be ordered for patients on half or quarter diet with the Principal Medical Officer's orders.

TABLE OF ORDINARY DIET.

		Full	¾	½	¼	Soups	Bouillon
Coffee (with or without milk and bread)	60 grammes	1	1	1	1	As required.	As required.
Soup	50 centilitres	2	2	2	2		
Bread..	grammes	500	375	250	125		
Meat (cooked, without bone or tendon) ..	,,	160	120	80	40		
Vin ordinaire ..	centilitres	50	40	30	20		
Meat (raw, per patient for soup)	grammes	400	300	200	10	30	30

Officers are further entitled to a dish of eggs, meat, two choices of dessert, cheese and fruit. The food is prepared, under the direction of paymasters, who control expenditure, by either a nursing sister of mercy or by a corporal cook.

The former officer and the surgeon on duty are responsible for its proper distribution. The same officer inspects and passes the food. In case of complaint against the contractors a report is made to the Captain-Surgeon, or at need to the Principal Medical Officer, who adjudicates.

After the round of visits the register of medical prescriptions is taken to the dispensers and the medicines are distributed to the divisions as they are made up. The pharmacist in charge for the week has to ascertain personally that medicines ordered reach the patients or the persons indicated by the surgeon to administer them. In the absence of the "treating" surgeon the general supervision of the hospital is assured, as in other commands of troops, by an orderly officer for the week and one for the day.

Orderly Officer for the Week.—An inspecting Captain-Surgeon who superintends the regularity of the general administration; he is assisted by a military pharmacist and a corporal-major (staff). His duty is to see to the prompt execution of orders, the training of orderlies, and the cleanliness of the hospital, &c. He supervises the kitchen and expenses, inspects the food and its preparation, both for the sick and the hospital staff. He is responsible to the Principal Medical Officer, to whom he reports daily, and from whom he takes orders. The dispenser on duty for the week, in the absence of the directing pharmacist, prepares the medicines prescribed at other than the regular visits and sees to their proper distribution in the wards.

The inspecting non-commissioned officer maintains order, attention to dress and discipline amongst the orderlies on duty, assists the medical officer on duty and reports all irregularities to him. In most hospitals quarters are provided for a Captain-Surgeon, so that the medical officer on duty may have his assistance in urgent cases.

Officer for the Day.—The daily service (or guard) is controlled by a subaltern medical officer who is under the orders of the inspecting Captain-Surgeon. His duty is to see that proper attention is given to the sick and that all duties are properly performed in the hospital. He has under his immediate orders a corporal, a sanitary aide, the hospital orderlies, the attendants placed in special charge of grave cases and prisoners; he lives in the hospital. Whenever the number of subalterns in the hospital falls below five, medical officers of the same rank are drawn from the garrison to do guard duty in the hospital.

Orderly Room.—The Principal Medical Officer of the hospital after the morning visit, daily assembles the officers doing duty in the hospital, and with the company, receives the daily reports and communicates his orders. Once a week, generally on Sundays, the Medical Officers and Accountants of the Hospital and of the Sanitary Company are assembled in a "Grand Orderly Room" before the Principal Medical Officer, who makes his observations and gives his orders orally, dealing with all matters relating to the conduct of duties and discipline.

Organisation of the Sanitary Company.—The Captain-Surgeon Senior Adjutant commands the company in the same manner as a company officer in other branches. He is assisted by a junior adjutant, and has as accountants a quartermaster and a quartermaster-corporal.

The Principal Medical Officer of the hospital exercises over the company the authority of a military commanding officer. He may at his pleasure depute one of the senior medical officers of the hospital to inspect it. In the absence of the company officers the medical orderly officer for the day commands the company. Medical officers and the non-commissioned officers take part in the duties of the hospital. The daily duties are fixed by the Principal Medical Officer, and must be so arranged that each man has at least seven hours in bed and ten to twelve hours' duty or instruction. After two months drill as ordinary soldiers recruits of the company pass to the hospital and attend technical courses of instruction. They are divided into three categories: sanitary aides, hospital orderlies, and stretcher bearers, each having its own grades. The whole receive the special training of a military stretcher-bearer and similar to that imparted to the regimental stretcher-bearers and orderlies. The infirmary attendants and sanitary aides receive in addition special and more extended instruction applicable to their more responsible duties.

Attention is drawn to the fact that in the Italian Army the military medical officers are in sole charge of their technical branch, are in

command of the hospitals and of the sanitary corps. The accountant officers are solely concerned with accounts and with the handling of money and the checking of stores.

Attached and Thermal Hospitals.—These are established in small garrisons, or at such medicinal springs to which soldiers are sent for courses of treatment. They are dependencies of the hospital in whose district they occur and are attached to them for administrative purposes. The senior medical officer on the spot commands.

Civil Hospitals.—Where military hospitals are not available sick soldiers are received into local civil hospitals. These are, as far as possible, treated in special wards and under the regulations of the Military Hospital Councils of the territorial division. The garrison medical officers are held responsible for the exercise of continuous supervision, and report to the Officer Commanding the troops on matters affecting discipline, and to the Principal Medical Officer of the chief hospital on technical points. When invited to do so by the civil surgeons in charge of the cases, they are required to attend consultations and operations on the soldier patients.

Garrison Infirmaries (*Infermierie di presidio*).—In such garrisons as have no proper military hospitals the district, or the more stable assemblage of troops, organises a garrison infirmary, of which the senior medical officer of the garrison takes charge, and the administration devolves upon the Council of Administration of the corps. The Registrar of that Council is charged with the direct supervision of the infirmary, and makes all provisions required by the Medical Officer in Command; he is assisted by an accountant officer for the control of pay and stores. A military dispenser and infirmary attendants from the sanitary company are attached in the required numbers to supplement the services of those drawn from the troops in the locality. According to their importance these infirmaries are divided into four classes; beds are reserved in them for sick officers. The soldiers under treatment are held as being in hospital.

Patients requiring prolonged treatment, conscripts who are ill, soldiers who are to be "reformed," or who are under observation, and litigious cases, must, as far as possible, be transferred to the principal hospital. From the latter are drawn all requisites for treatment, but always at the expense of the corps, upon which the cost of the administration of the hospital devolves. The rationing is the same as for other hospitals.

Special Infirmaries (*Infermierie speciali*).—This name is given to infirmaries attached to military schools and punitive establishments; these are worked in the same way as those previously described.

Sanitary Service in connection with troops is carried out by an orderly officer for the week, who answers directly to the Officer Commanding the troops. His duties consist in a daily visit to the sick, inspection of those discharged from hospital, inspection of men returned

from a fortnight's leave, the weekly sanitary inspection of the troops, examination of recruits in the presence of a superior officer of the regiment concerned, presence at the meetings of the Administrative Council, when engaged men, re-engaged men and candidates for the gendarmerie are inspected, and finally attendance at matches, target practice and bathing parades.

One of the regimental medical officers must either reside in the barracks or in its close neighbourhood. The orderly medical officer for the week reports daily to the Captain-Surgeon of the corps on all points connected with his branch, so that the latter may at orderly room report to the Officer Commanding and take his orders. If the Captain-Surgeon is engaged on other duty the orderly officer for the week attends the regimental orderly room in his stead.

The daily sick inspection takes place either in a ward of the infirmary, or in a locality indicated by the Colonel. The weekly sanitary inspection is held in the quarters of the troops. Slight complaints are treated at the infirmary, the direction of which is under the senior medical officer of the regiment. This officer conforms for administrative purposes to the orders of the Commanding Officer, and for technical purposes to the instructions of the director of the hospital. He also is in touch with the Registrar of the Council of Administration, which has the supervision of the hospital. The senior surgeon is assisted in Infantry and regiments of Bersaglieri by a sanitary-aide-corporal; in Cavalry, Artillery and Engineer regiments by a non-commissioned officer detailed by the Colonel, besides which, men from the regiments are placed at his disposal as permanent detachments.

In the infirmary the patients receive the ordinary rations, always, however, under the orders of the surgeon; some of them may receive special diet. The cost is borne regimentally; the pay of the privates and corporals goes into the regimental coffers. In the case of bandmasters and sergeants the deduction from pay amounts daily from 70 to 30 centimes.

The medical officer on duty attends marches, manœuvres, target practice; and on such occasions carries, as his personal equipment, a dressing case of surgical instruments, a hypodermic syringe and a packet of "permissions for men to ride in the ambulance waggons."

The regimental medical officer in the months of January, February and March annually instructs the regimental soldiers told off as sanitary-aides and stretcher bearers by means of a course, theoretical and practical, of thirty lectures, as laid down in the current *Istruzione sul servizio dei portaferiti in guerra*, which is identical with the instruction imparted to the members of the Sanitary Corps.

(*To be continued.*)

Abstracts.

THE FRENCH ROULE-SAC.[1]

By Lieutenant-Colonel J. E. NICHOLSON.
Royal Army Medical Corps (ret. pay).

My only excuse for thus tardily bringing forward this subject is that I have not yet seen any account of this *roule-sac* in our Journal, other than a brief allusion to it in the course of my remarks on a somewhat similar subject, which appeared in the issue of the Journal of the Royal Army Medical Corps for November, 1904.

The *roule-sac* is a wheeled contrivance for carrying knapsacks on level ground or on the high road.

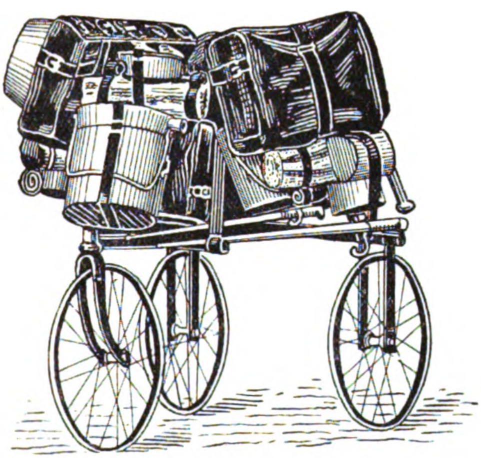


Fig. 1.—Roule-sac Saint-Paul-de Roffignac (Mark I.).

The load to be carried by the infantry soldier has always been one of the chief subjects for serious consideration with military commanders, and the knapsack especially has been the subject for much discussion, whether as regards the materials of which it is made, or of the ways in which it should be carried, or yet again, as to what should be its legitimate contents and how these should be arranged, also as to whether this load need necessarily be carried by the soldier so long as it remains readily accessible when required.

[1] From a small work by Dr. F. Baudoin, of Tours, entitled "Hygiène Militaire La question du Roule-Sac devant l'opinion." Paris, 1906.

As far back as 1878 Mr. Bazin devised a so-called ***military wheelbarrow***, chiefly for use with the French Marine Light Infantry in Cochin China. The handles of this wheelbarrow were formed by two rifles, to which two knapsacks were attached to form the body, the whole being supported by two small light wheels; two soldiers then took turn and turn about to draw this little trolley.

FIG. 2.

In 1896 Major Padrin, of the Italian Army, devised the *cyclo-sac*, also for the carriage of two knapsacks; in this contrivance there was only a single wheel, and the handles of this wheel-barrow were apparently formed by the two poles of the *tente d'abri*.

In 1902 Surgeon-Major Sáint-Paul, of the French Army, in collaboration with a regimental brother officer, Lieutenant de Roffignac, invented the *roule-sac* (Mark I.), which consisted mainly of a small tricycle, capable of being taken to pieces for convenience of carriage. This vehicle weighed about 16 lbs. and carried six knapsacks or any weight not exceeding 400 lbs.; it could be subdivided into four parts, and the

platform bars of its floor were formed by four sword bayonets, (*vide* fig. 1). This *roule-sac* was, I believe, first described in the *Touraine Médicale* for November, 1902.

In the *Giornale Medico del Regio Esercito* for July, 1904, Surgeon-Lieutenant R. Castellani, of the Italian Army, described three models

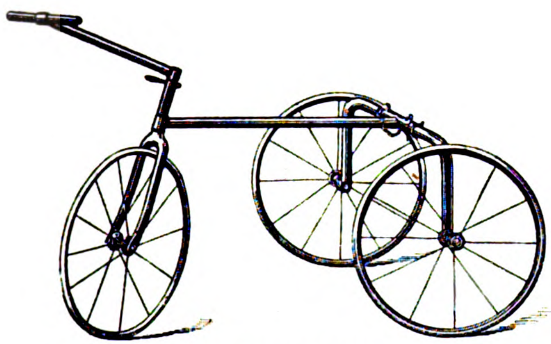


FIG. 3.—Roule-sac Saint-Paul-de Roffignac No. 2.

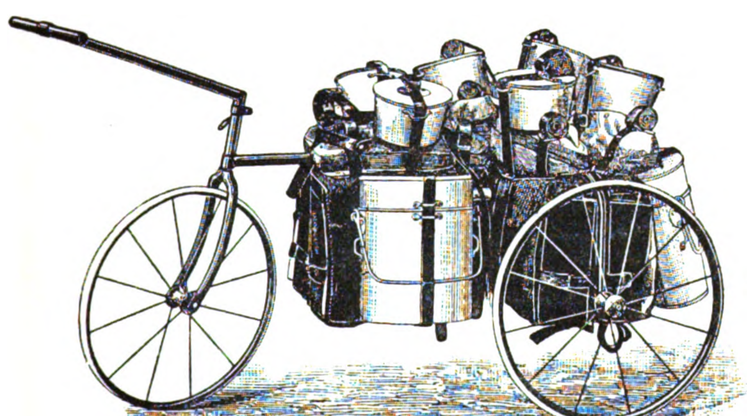


FIG. 4.—Roule-sac Saint-Paul-de Roffignac (Mark II.).

which he had devised for *wheeled knapsacks*, each complete in itself and suitable for a single individual. One of these is shown in fig. 2. As these have already been described in the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS (November, 1904, pages 565-567), I need here do no more than refer to them.

The latest type of the Saint-Paul-de Roffignac (Mark II.), differs from its predecessor in several noticeable particulars. The sword-bayonet

platform has been done away with (*vide* fig. 3), and the knapsacks are now slung in pairs across the main cross-bars of the frame-work, thus lowering the centre of gravity and thereby giving greater stability to the vehicle (*vide* fig. 4). The apparatus can be readily and quickly resolved into its seven component parts (as in fig. 5), and is then carried piecemeal as in fig. 6. The total weight of the machine (Mark II.) is just under 16 lbs., and it can carry eight knapsacks.

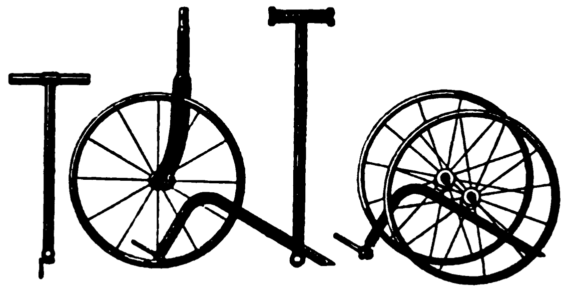
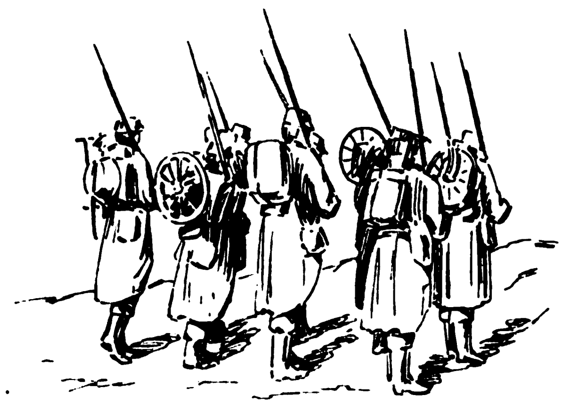


FIG. 5.



It is worthy of note that, only so recently as three years ago, when the question of the *roule-sac* was first mooted, the idea was received with derision and was greatly ridiculed in the public press, and yet, that less than two years later this despised *roule-sac* was especially ordered to be officially tried at the manœuvres held between Tours and the Camp of Le Ruchard during the summer of 1904, and that Surgeon-Major Saint-Paul was then formerly presented by the General Commanding the 19th

Army Corps to the Generalissimo of the Forces, and then publicly thanked by him "for his ingenious method for lightening the load carried by the soldier on the line of march."

It is calculated that if each company were supplied with three of these *roule-sacs* (which can travel side by side in rear of the company), the ground occupied by each company would only be lengthened by a yard and a half, so that the length of the road occupied by an infantry battalion on the line of march would not be appreciably increased.

This portable little carriage is primarily intended to render useful service in those cases in which soldiers, either by reason of temporary fatigue or through accidents, have to be temporarily excused from carrying their packs. But it is also quite within the range of possibility that, if supplied to a whole battalion, this small tricycle cart might, by lightening the soldiers of a useless load, revolutionise modern tactics.

The chief objections to this method of carriage are, to my mind, twofold: (1) any one portion of this cart being damaged or lost would probably render the other parts useless, and (2) the difficulty of readily replacing these damaged parts when on active service; but as the same objections might be applied to almost any wheeled contrivance, including a field-gun, I do not consider that they need be too seriously taken into account when the manifest advantages to be derived from the general adoption of the principle of the *roule-sac* are dispassionately considered.

Extracts, &c.

BACTERIAL TREATMENT OF SEWAGE.[1]

By Lieutenant-Colonel R. PORTER.
Royal Army Medical Corps.

The question of the proper disposal of domestic sewage is at the present moment exercising the minds of a large number of municipalities, and those who are responsible for the public health of the various colonies in this country. The system adopted in most towns in South Africa, viz., removal by pails, is both crude and expensive, and the time is not far distant when public opinion will demand more up-to-date methods, which will be more hygienic, and less expensive, than those which obtain at present.

My presence here to-day is to advocate for municipalities the adoption of a system which only requires to be known to be appreciated, a system that I am sure, with a little more extended experience, will fulfil almost everything that is demanded by sanitarians of the present day, not only as the most perfect method known to science, but also on account of its being less expensive than any other method hitherto tried. I allude to the closed septic tank system which has been introduced during the last two years into some of our cantonments in this country. All medical officers who are engaged in public health work, will, I think, recognise the value of this method, which is based on true scientific principles, and the experience gained in England during the last ten years, and in this country within the last two years, will, I think, convince most people that at last we have hit upon a plan of disposal of sewage, which is simple, cheap, and, above all, gives an effluent which shows 90 per cent. purification over the raw sewage.

For the benefit of those who have not studied the question I shall briefly describe the principles involved in the reduction of the crude sewage, the vital process by which the reduction is brought about, and the chemical changes which take place. I shall then give you a short description of the installation which has been erected in Pretoria.

The principle of the septic tank was first of all brought to notice by Professor Warrington in England, and Meintz and Schloesing in France, and the practical details were worked out by Cameron, of Exeter. They showed that purification of sewage by filtration is brought about by the intervention of micro-organisms, and that sewage contains the bacteria

[1] Paper read before the South African Medical Congress, at the meeting held at Pietermaritzburg, June, 1905.

necessary for its own destruction; these are of two kinds, anærobic and ærobic. These micro-organisms play two very important and distinct parts in the disintegration of the solids and purification of ordinary sewage, and to ensure the work being carried out quickly and satisfactorily they must be kept perfectly separate. The work of the anærobic bacteria, which is a fermentative or putrefactive process, is done in the closed septic tank, and that of the ærobic bacteria in the contact or filter beds.

First of all let us examine for a moment the problem of the working of the anærobic process. In the broadest sense this process is fermentative, and it is brought about by living organisms which break down the complex nitrogenous substances found in sewage; these bacteria unlock the complex substances that they attack, and the result is that they fall to pieces. In manure, for instance, large quantities of ammonia are given off under the influence of certain bacteria, which are particularly apt to destroy urea. Speaking generally, the anærobic bacteria break up the more highly organised products of life, and so produce unstable substances that are readily attacked, especially by oxygen. One or two molecules of oxygen or hydrogen, nitrogen or carbon, are snatched from a large and complex molecular group, and this group is left in a very unstable condition, or in the form of a number of rearranged and profoundly altered molecules, many of which readily undergo oxidation.

When fæcal and other solid matters are first discharged into sewers the first changes that take place are ærobic, on account of the free oxygen dissolved in the water and contained in the air. These micro-organisms act on the simple constituents like ammonia; nitrates in small quantities are therefore formed in the sewers; as soon, however, as the free oxygen has been exhausted, the bacteria which require air will in part disappear, and in part remain quiescent to renew their functions at a later stage. On the other hand, anærobic organisms will commence to multiply, causing a solvent action to take place in the solids which is parallel to ordinary digestion, that is a peptonisation of the solids into a soluble form, the result of which is the formation of such substances as leucine, tyrosine, and a number of substances of the aromatic group. All these processes take place in the septic tank, and it is evident that by means of its bacteria, enzymes or spontaneous chemical decomposition, the raw sewage is materially altered. Table marked I. shows the change that has taken place in the tank effluent over raw sewage, and the filtrate over the tank effluent, after one month's working.

You will see from this table that there is a reduction of about 30 per cent. of the organic matter as measured by the oxygen consumed, an increase in the free ammonia, and a reduction in the organic or albuminoid ammonia. In the tank is found carbonic acid gas, nitrogen, marsh gas and hydrogen. At Exeter the tank is air tight, and the combustible gases, mostly in the form of marsh gas are, regularly burnt, although its illuminant power is rather indifferent.

Table. I.

Army Medical Services—Chemical and Bacteriological Laboratory.

Analysis of samples of sewage received (April 13th, 1905) from the D.O.R.E., Pretoria. Samples marked No. 1, raw sewage; No. 2, septic tank effluent; and No. 3, filtrate.

(1) *Raw Sewage.*

Ammonia free	1·162	parts per 100,000
" albuminoid	1·156	" " "
Oxygen absorbed, 4 hours at 80° F. ..	3·607	" " "
Nitrates	0·05	" " "

(2) *Septic Tank Effluent.*

Ammonia free	3·264	parts per 100,000
" albuminoid	0·476	" " "
Oxygen absorbed, 4 hours at 80° F. ..	2·296	" " "
Nitrates	0·07	" " "

(3) *Filtrate.*

Ammonia free	1·088	parts per 100,000
" albuminoid	0·282	" " "
Oxygen absorbed, 4 hours at 80° F. ..	0·851	" " "
Nitrates	0·13	" " "

Remarks.—Purification about 75 per cent.

This is after working one month. The tank and filter bed require about three months to mature, when the purification should show about 90 to 95 per cent. purification.

The organisms which bring about these results are known as anærobic, that is, they work and live in the absence of oxygen. In these closed septic tanks the amount of ammonia formed, and the amount of peptonisation or digestion by which the solids of the sewage are thrown into solution, is an index of the work done by these micro-organisms. In the anærobic process which I have tried to put before you, I would like it to be understood that in the tank in which it occurs there are other micro-organisms which are probably ærobic, and there are organisms which may be either anærobic or ærobic, according to the food material which is supplied to them; these are called facultative. What I want to impress on you, however, is that the main work of the tank is anærobic, and if the two processes are brought together the work is not done so efficiently as if they are kept separate. I mention this fact as some authorities in England maintain that these processes can go on side by side in the same tank; undoubtedly they can, but to get the best work out of these microbes they must be kept separate. Some beautiful experiments have been made to show the antagonism which exist between certain organisms. I need not refer, however, further to them; the practical point is that the anærobic process should be kept distinct from the ærobic; by doing so, these digestive processes by which the solids of sewage are reduced, take place more rapidly and are more efficiently performed than when these two processes work side by side. With regard to the ærobic organisms and the work that is done

by them, these microbes appear to do a great deal of work by the use of a small amount of energy; they grow in the presence of oxygen, and nitrification of the effluent is carried out by these bacteria. These organisms perform the work in the filter beds after the effluent has left the septic tank. When sewage is run over land the same processes take place, and the micro-organisms are exactly the same, but in these installations, which work the process that I have been describing, the advantage over the land distribution is the rapidity with which the work is performed; and one installation which I shall presently describe to you is capable of dealing with an amount of sewage that would require a large area of land to purify.

The installation required for the working of these processes is a closed septic tank and a series of filtering or contact beds with automatic alternating gear and a plot of cultivated land on which the effluent is run, as seen on plan A, or instead of the contact beds, a percolating bed which is shown in plan B, with revolving arms called sprinklers. This is more recent and I think an improvement on the filtering beds, as it ensures a more uniform distribution of the effluent after it leaves the septic tank; and from the experience of the analysis of the filtrate as it leaves the contact beds and the percolating bed, the latter shows a greater purification than does the former; it is moreover cheaper and not so liable to get out of order.

The septic tank is built in cement and concreted, and is arched over. It is about sixty-four feet long, eighteen feet wide, with a capacity of 60,000 gallons; at the end, where the sewage enters, there are two grit chambers divided off from the rest of the tank by a partition wall. The sewage enters into one or other of these grit chambers by a six-inch pipe at a point about five feet from the bottom of the chamber. Each grit chamber is ten feet deep from the water line. In the roof of each chamber there is a manhole with an air-tight cover. From the chamber sewage flows over the dividing wall into the main portion of the tank, which has a depth of about seven feet from the water line. The outlet from the tank is at the opposite end of the grit chamber and consists of an iron pipe which conveys the effluent to a main, and from thence it is distributed to the contact beds as shown on the plan. There are eight of these contact beds with two sets of alternating gear, one for each set of four beds. These beds are built in concrete, each having an area of eighty square yards with a depth of about six feet. On the bottom of the filters are laid a series of drains which collect the filtrate and convey it to a main which discharges into a well. The filtrants are mainly coke-breeze on the top, broken brick in the centre, and stone ballast at the bottom. All these materials are broken up so as to pass through an inch ring. One of the filters in each set is always at rest, and the whole arrangement is automatic, being worked by the alternating gear shown in the plan. The alternating gear consists of two

buckets attached rigidly to a shaft, and to that shaft is also attached the outlet valves from any two of the filters, and the inlet valve also to the filters. When one filter is filled the sewage overflows to one of the buckets, the bucket is depressed; this opens the valve of the filter to be discharged, and it shuts the valve of the filter to be filled, and at the same time diverts the current to that filter. The principle is that one filter stands full, whilst another is being filled. The whole process works automatically, and by having two sets a certain period of rest is arranged for each filter, about six hours in the twenty-four. The alternating gear requires a little adjustment occasionally, and it is estimated that the contact beds will work for about two years, when it will be necessary to refill them.

A more recent installation erected for the sewage of the artillery barracks, civil hospital and railway at Pretoria is, I think, an improvement on this. Instead of having contact beds there are two large percolatory beds. By this method the septic tank effluent instead of being retained in the contact bed is sprinkled over the surface of the bed. Thus an even distribution of the sewage is effected, as shown in the diagram, by a revolving automatic sprinkler on the Barker-Mill or recoil principle. The sewage falling from the sprinkler slowly trickles through the filtering media. The filtrant is much the same as used in the contact beds, namely, three feet of coke-breeze, two feet of broken brick, and three feet of broken stone ballast. The floor of the bed slopes to one side and the filtrate immediately drains into a culvert surrounding the bed, and thence it is conducted into a water course or over a garden. This is a much less expensive method than the contact beds, and from analysis of the filtrate which has been made it gives a rather better purification than does the contact bed system.

The sludge may be reckoned as quite a negligible quantity, and may be drawn off once a year without disturbing the top sewage from the septic tank.

No smell arises from these beds and there is only a faint odour from the septic tank at close quarters. What makes these artificial bacteria beds a far more economical and rapid means of purifying sewage than a sewage farm can be, is the fact that the beds can be of any depth. The bacteria will establish and maintain themselves in these beds in the highest state of activity as readily at the lowest layer as at the top, whereas in the sewage farm they cannot usually live at a greater depth than eighteen inches from the surface. Another great point is the great saving in expense over the sewage farm. In the installation which I have described one European undertakes the whole work, and he can learn everything he requires to know in a few days. The initial expense of these installations is not very great. The cost of the latest installation at Pretoria, to take barracks, civil hospital and railway, approximately for 5,000 people, was £5,000. This is unusually high, as the Town Council

selected a site which entailed heavy expenditure in excavation. The total septic tank capacity is 125,000 gallons, which of course is high for a population of 5,000 and the cost is at the rate of £40 per 1,000 gallons. At Exeter the cost was only £6 17s. per 1,000 gallons, and at St. Leonards £8 per 1,000 gallons. I think in this country a reasonable figure would be about £25 per 1,000 gallons of sewage to be treated daily, and the larger the work the less the cost, estimated at a rate per 1,000 gallons. Compared with the pail system I have taken some trouble to work out the relative financial saving that would be effected by adopting the septic tank system, and I think that for every £3 now spent on rates by householders for the pail system £1 would be saved by substituting the modern water carriage system with septic tank. At Pretoria it is estimated that the system will have paid for itself in six years, and then there will only be the cost of maintenance, which works out at a fraction of a penny per 1,000 gallons treated. The maintenance of the installation can be easily recovered if the filtrate is allowed to flow on to land. Vegetables alone, we found in Pretoria, paid the working of the garden and the wages of the European, and this could be easily increased, as we sold our vegetables to military only, at a cost far below the market price, as we did not wish to make any profit.

These processes of purification require supervision, and whatever installation be used experiment and observation have shown that the best results are obtainable when the sewage remains in the septic tank for about eighteen or twenty hours, that gives about a speed of one inch per minute of the flow in the installation which I have described to you. If the sewage is allowed to remain too long in the septic tank, or the tank is too large for the work to be done, some of the processes which should take place in the filter bed are commenced in the septic tank. What should be aimed at is to prepare the sewage for the aerobic processes which take place in the filter bed, and in dealing with domestic sewage it is found that eighteen to twenty hours is the time which gives the best results. If kept too long, putrefactive changes take place which give the sewage an offensive odour, and these changes are inimical to the treatment which the effluent undergoes in the filter beds. It has been found that the odour from the septic tank when properly worked is very small, and at Exeter the installation is within a few yards of a public thoroughfare and seventy yards of a large house without producing any nuisance.

After the tank is taken into work it takes about three months before the anaerobic process is thoroughly established, when it is said to be mature. A thick scum is then formed on the top and a certain amount of sediment in the bottom, and care should be taken that these are not disturbed by storm waters, &c. In this country during certain seasons very heavy rains fall, and I think it would be better to have a separate system for the surface water and not allow it to run into the sewers.

It has been found that if the sewage is too dilute, that is during heavy rains, the work of the septic tank is not so efficiently performed as when the sewage is in its normal condition.

With reference to the filtrate after it has left the contact or percolating beds: is there any danger of pathogenic germs escaping? This question has received a good deal of attention, and from observations which were made in the bacteriological laboratory, Pretoria, it was found that there was a very great reduction in the number of micro-organisms per cubic centimetre, and at Exeter it was found that an experiment made by inoculating sewage with typhoid bacillus and afterwards submitting it to these biological processes, 90 per cent. of the bacilli were removed. Spores of the *Bacillus enteritidis sporogenes* survive the septic tank, but it has been shown that 90 per cent. of these are removed after passage through a well ærated filter. Lawes and Andrews showed that some of the liquefying organisms have a germicidal effect upon typhoid bacilli, so that their sojourn in a septic tank with such organisms diminishes their chance of survival.

We may take it therefore that although pathogenic germs may be found in the filtrate they are so diminished in quantity that the further filtration which takes place on land would render them practically innocuous.

With regard to the filtrate being discharged on land which is cultivated, I think it can be said that vegetables which are eaten cooked may be safely grown, but it would not probably be wise to grow vegetables that are eaten in an uncooked state.

These are the main principles concerned in the bacterial treatment of sewage, with a description of two installations now in work in this country. I think it will be found in all municipalities, or even in private houses where sufficient water is available, that this method of treatment of sewage is a sound one. In this country where enteric fever is endemic and at certain seasons epidemic, disposal of sewage is of primary importance from a public health point of view, and anything that will diminish the prevalence of this disease deserves serious consideration.

It is not my intention to discuss the cause of enteric fever, but I would point out that with an experience now extending over two years of the working of this system of disposal of sewage, the incidence of this disease has been considerably diminished in a community which is very susceptible, where these installations have been worked, and I am convinced that this is in a great measure due to the improved sanitary surroundings which have been produced by these biological methods to which the sewage has been submitted.

I have to acknowledge the kindness of Mr. W. S. Prentice, Sanitary Engineer, Johannesburg, for permitting me to use the diagram showing the methods for purification of sewage.

Reviews.

The Medical Diseases of Egypt. Part I. By Dr. Sandwith, M.D., F.R.C.P. London: Henry Kimpton. Price 7s. 6d. net.

This is the first of a series of volumes on the medical diseases of Egypt (of which apparently at least three are contemplated), and is an amplification of lectures delivered by the author to the students of the Egyptian Government School of Medicine. It does not profess to be a complete treatise, and the author assumes the possession of a systematic work on general medicine.

Nothing is more valuable than a careful record of the individual experience of an accurate observer, and Dr. Sandwith, after an experience of over twenty-one years in Egypt, is well qualified to deal with his subject. But one is tempted to regret the form in which this book has been written: as an amplification of lectures to students, it contains a good deal of "text-book" information, often in a very compressed or conversational form, as, for example, the section dealing with the pathology and morbid anatomy of enteric fever. Dr. Sandwith's own observations would have been equally valuable without these unnecessary additions, and the bulk of the volume would have been considerably reduced, an important matter in all books dealing with the diseases of warm climates, which should be carried about the world with their fortunate possessor.

Dr. Sandwith deals, however, with more than the so-called "Tropical Diseases." After an interesting chapter on the Medical History of Egypt, and an Introduction to Infectious Diseases, the author treats of the Continued Fevers, the Exanthemata, Mumps, Whooping Cough, Influenza, Glandular Fever, Plague, Bilharzia Disease, Ankylostomiasis and Pellagra.

The best sections are those on Bilharzia Disease and Ankylostomiasis, both endemic in Egypt in a severe form. That on Bilharzia is unusually complete. It includes a translation of Professor Loos' article in Mense's *Handbuch der Tropen Krankheiten* on the natural history of this parasite. As regards the mode of infection, observations in Egypt have shown that the more closely any class of the population comes in contact with the soil, as in agriculture (except possibly in the case of the Sudanese), the greater is the degree of prevalence of bilharzia disease among that class, an observation which tends to support the theory of infection through the skin.

A bilharzial cirrhosis of the liver has been recognised for some time, and Dr. Sandwith has seen concomitant ascites in a certain number of cases, in some of which the diagnosis was verified by *post-mortem* examination. As regards the duration of the disease, an important point, as so many men became infected during the South African war, Dr. Sandwith believes that most cases lose their symptoms within three years from the time of leaving the country where they contracted the disease, that is, where re-infection is excluded. As a systematic examina-

tion of all cases of men discharged the service is now being made, additional evidence should soon be available on this point.

Bilharzial disease is, in Egypt, a very much more serious affair than in, for example, South Africa, due probably to the much greater degree of infection, up to 436 parasites in one of Dr. Sandwith's cases. The author finds nothing gives such good results as the liquid extract of male fern. Thymol, he says, is useless.

The "Egyptian chlorosis" has, since 1887 (when Dr. Sandwith first began a systematic anthelmintic treatment in these cases), been recognised as in most cases due to ankylostoma, and since 1894 Professor Loos has worked carefully at the subject, which is important not only to the individual but to the State. Dr. Sandwith includes a translation from Professor Loos' article in Mense's *Handbuch*, covering practically all that is known of the natural history of the parasite: the development of the larvæ to maturity, the infection by these mature larvæ (the immature larvæ are harmless), and their entrance through the skin, principally by the hair follicles, are fully described. Dr. Sandwith calls attention to the association of "ground itch" with the presence of these larvæ in the soil, but a fuller account of this skin infection may be found in the article on ankylostomiasis, by Professor Guiart in Bruardel and Gilbert's *Nouveau Traité de Médicine et Thérapeutique*. As regards treatment, the author considers that it is a waste of time to try any other drug than thymol as an anthelmintic in this disease.

The account of Pellagra is extremely interesting, and should assist its recognition in localities whence it has not as yet been reported. It appears to be associated with the use of maize (especially of bad quality) as a food stuff, and it is a curious coincidence that the recognised "food" diseases, Ergotism, Lathyrism and Pellagra, should involve the nervous system so frequently, though in different ways and to varying degrees. If beri-beri is in fact caused by the use of bad rice, it would form a fourth member of an interesting group.

Relapsing fever now receives less attention in our medical literature than formerly, and the possible confusion of its severest form, the so-called "fièvre bileuse typhoide" of Griesinger, with enteric fever is noted by the author as occurring in practice.

The relative immunity from enteric fever of native races in warm countries as compared with Europeans is an exceedingly interesting and difficult question, and Dr. Sandwith contributes some valuable notes on this point. The incidence among Egyptian troops between 1892-1902 was less than one-tenth of that among the British Army in Egypt between 1888-1902. One may note here that in India the incidence among native troops increased from $\frac{1}{88}$ of that in British troops in 1892-96 to $\frac{1}{29}$ in 1903, so that the relative immunity in the Egyptian Army is less than in the native troops in India. This may be accounted for by the inclusion of the British officers and non-commissioned officers in the statistical returns of the Egyptian Army. But where, as in Egypt, between 1888-1902 (and annually in India) repeated importations of fresh British troops have occurred, too much stress should not be laid on the comparison of the relative incidence rates, as the contrast is not only between Egyptians and Europeans, but between comparatively recently arrived (and more susceptible) individuals, and those who may be conveniently described as "acclimatised." The two groups are not then

strictly comparable as regards the actual *susceptibility* to disease, as all our experience goes to show that a high incidence rate has always prevailed among troops sent to a country where enteric fever is endemic during the first two years of the residence there.

But in some twenty-five of the Egyptian Government hospitals cases of enteric fever are very rare, and Dr. Sandwith gives figures referring to the largest of these hospitals. In the Kasr el Ainy Hospital he had only six cases of enteric fever out of a total of 8,752 cases during the twelve years 1890-1901. Probably, as has been the case in India, a systematic use of Widal's reaction would show the proportion of enteric cases to be greater among the natives than clinical observation has shown, but, on the other hand, in a series of 1,100 autopsies only one doubtful case was seen, and in a further series of 835 not one case was observed. Many of the patients who attend the Government hospitals are Government employees, who are compelled to go to the state hospital when on the sick list, so that selection has not influenced the result to any marked degree. There appears, then, to be conclusive evidence of the comparative rarity of enteric fever among Egyptian adults. But since 1902 this disease appears to be on the increase among the natives, both native Egyptians and Sudanese, and among town dwellers this increase is more marked. Generally speaking the immunity of town dwellers is less than that of the rural population[1] (the rural population are on the whole, however, less under observation than the town dwellers, so that this distinction should be qualified), and similarly the natives of the Egyptian Army appear less immune during their period of service than before enlistment, or after the termination of their five years' engagement. But, as Dr. Sandwith points out, this increased susceptibility during service may only be apparent, because the soldier is under constant observation while the rural population is not.

The greater susceptibility of the native while living under conditions more like those of the European, or in close association with him, is a phenomenon which has been observed in almost every country where there are the two races, and where enteric fever is endemic. This is certainly the case in India, while all the evidence points to similar conditions in China and South Africa. Alongside this should be placed the observation that a native transferred from his own, a "typhoid-endemic" area, to another endemic area, appears to lose some degree, sometimes more, sometimes less, of his immunity. An explanation is not easy.

This native immunity has usually been explained by an assumption of attack during childhood. But if it is true that an alteration of the conditions under which he lives partially or completely destroys this immunity, this seems to show that such an hypothesis will not adequately explain all the facts of the case, and that more than one factor is involved. Dr. Sandwith indeed speaks of this hypothesis as an "erroneous theory," and "disposes of this theory quite shortly" by relating the results of some hundreds of autopsies on children *under the age of five years*, in which not one case was found which showed pathological evidence of enteric fever. This evidence, however, is not so strong as

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[1] European and American experience is that enteric fever is certainly more a disease of the rural population.

Dr. Sandwith appears to think. A European child under five years of age is less susceptible than at any other age. In the Hamburg General Hospital in 1886, of 1,445 cases at all ages, only 15, or 1·0 per cent. of the total cases, were under 5, and in 1887, of a total of 2,241 cases, only 17, or 0·76 per cent., were under 5 years of age; of 451 cases in children under 14 in this hospital during the two years named, only 32, or 7·15 per cent., were in children less than 5 years old. In the Jacobsspital, Leipzig, between 1880-93, only 22 of 1,626 cases of all ages were under 5, that is, 1·39 per cent. of the total at all ages. In Paris, 1880-89, out of 16,036 deaths at all ages, only 1,077, or 6·7 per cent., were in children under 5. In London, 1896, the attack rate per 100,000 living children under 5 was, for males, 38; for females, 31; while between 5-10, it was for males, 102; for females, 81. The corresponding death rates were 6, 5, 12, and 7, respectively. In the London County Council area in 1903, the attack rate per 100,000 living under 5 was for males, 21; for females, 18; while between 5-10, it was for males, 64; for females, 55; that is about three times the attack rate under 5, while the death rates in both sexes were 1 per 100,000 under 5, and 3 between 5-10. The attack rate in children steadily rises with increasing age till about 14, the beginning of the maximum period. This is well seen in the diagram by Professor Karl Pearson, F.R.S., in vol. i. of his "Chances of Death," showing the distribution of 745 cases in the Metropolitan Asylums Board Hospitals in 1891, which he says is very approximately the same as the distribution of 8,689 cases for the twenty years 1871-1893. So that all that Dr. Sandwith has shown is that at the period of minimum incidence the Egyptian child does not differ from the European. What has to be shown to prove the assumption of increased prevalence in natives in childhood is the shifting of the apex of the curve, the period of maximum incidence, to the left, that is to some year under 14, and observations in the first quinquennium cannot be expected to show this.

The section on Malta Fever records the occurrence of sporadic cases in Egypt, and even of a small localised epidemic in the Port Said Government hospital. Much has been done in the investigation of this disease since this chapter was written.

The account of infectious jaundice (Weil's disease) is interesting. There is room for further observation and research on this subject.

This book is one that should certainly be read by all those interested in the diseases of warm countries, or the modifications which the common diseases of temperate latitudes undergo when transplanted to a lower latitude, and would be a valuable addition to our libraries. It is nicely got up, the type and paper are both excellent, the latter is free from that irritating gloss and unnecessary weight characteristic of many of the newer papers. But a more systematic work is desirable for personal use where one's library must be limited, as is usually the case in the Service.

One may point out that an "average yearly number" of cases or deaths (as given for example on pp. 98 and 53 respectively) is of no use whatever without some indication at least of the population to which the figures refer.

R. J. S. Simpson.

MEMOIR OF CATHERINE GRACE LOCH, R.R.C. By Surgeon-General A. F. Bradshaw, C.B. Published by Henry Froude, Oxford University Press Warehouse, Amen Corner, E.C. Price 4s.

This Memoir will be read with interest, not only by Miss Loch's friends at home and in India, but by all who are interested in the military hospitals in India, and by those who notice how the art of nursing marches with the progress made in medicine and surgery.

Great reforms have been made in nursing in the military hospitals at home, and for some years before Miss Loch commenced her work many attempts had been made by the medical officers to secure efficient nursing for their hospitals in India, but it was not until Lord Roberts had a seat on the Viceroy's Council, and the great need for skilled nursing was brought to his notice by Lady Roberts, that the Government of India consented to the formation on a small scale of the Indian Nursing Service.

Miss Loch, who was then a Sister at St. Bartholomew's Hospital, was the first Lady Superintendent appointed; she sailed for India full of hope and enthusiasm for her new work, but at first, as is shown by her letters, she found the limitations and difficulties of her military life almost unbearable. No status was given to the sisters in the hospitals, and no authority to enable them to carry out the great responsibilities laid upon them. Miss Loch had no voice in the selection of her staff, and some of the selections made in the country would have been almost ludicrous, had not the consequences of the appointments been somewhat serious. One lady was selected who had only had two months training in a Zenana Hospital, and had never seen a male patient in her life; another, whose training consisted of six months as pupil in an obstetric ward; and when Miss Loch refused to take the responsibility of putting them on duty, no sisters were sent to replace them, and a great deal of correspondence and anxiety was caused, but as Surgeon-General Bradshaw says in his preface, "By Miss Loch's decisive and level-headed judgment in these complex and trying circumstances, she obtained the high esteem of the medical authorities with whom she was brought into communication; undoubtedly under a less able and less judicious pioneer, the Indian Nursing Service could not have achieved the marked success which justified the Government of India in adding to the *personnel* and in extending the areas of usefulness."

Lord Roberts has written an appreciative introduction to the book, also testifying to Miss Loch's good work, and paying, as a soldier, a generous tribute to her memory.

Miss Loch took part in the Black Mountain's Expedition in 1888, for which she received the medal and clasp, she was also awarded the Royal Red Cross, and was allowed to recommend two of her sisters for this distinction, an honour of which she was justly proud. There are many interesting letters in the book, giving a record of hard work cheerfully performed, and of many advances made in the organisation of nursing.

Unfortunately, however, under this strain of work, combined with a trying climate, Miss Loch's health gave way, and she was invalided home in 1899. She returned to India in 1901, but shortly after her arrival she had a stroke of paralysis, and was finally sent home in 1902.

Although the hospitals in India, as far as the nursing is concerned, are still only in an initial stage, yet as can be seen from the pages of this book, many improvements have been made. A certain amount of

training is given to the regimental orderlies, who now remain in the hospitals for a year instead of being constantly moved. Two ladies form a Board at the India Office for the selection of suitable nursing sisters, and the number of trained nurses have been considerably increased, so there is every reason to believe that the work commenced on such good lines will be carried on and progress, so that in time the hospitals in India will come behind no other military or civil hospital.

Dictionaire des Termes Techniques de Médecine. By Drs. M. Garnier and V. Delamare. Paris, 1906. Price, 6 frs. 50 cents. (Maloine).

The ever-increasing abundance of new expressions, due chiefly to the habit of calling surgical operations, clinical symptoms, diseases, &c., by the names of their discoverers, has rendered a book of this nature as indispensable to practitioners as to students, as it supplies a ready and concise interpretation of the many new terms now employed in medical literature.

This handy little Catalogue gives a complete list, up to date, of the medical technical terms now in use, and should be invaluable to the busy general practitioner who can read French, and who—whilst anxious to keep abreast with the advance of medical knowledge—has little time to spare to hunt through treatises and journals for the correct meaning of an unfamiliar term which he may come across whilst reading a professional work.

Whilst quite familiar with such terms as Daltonism, Wardrop's operation, Argyll-Robertson pupil, or the Comma bacillus, he may perhaps be somewhat at a loss to readily interpret such expressions as Troisier's ganglion, MacBurney's symptom, Godelier's law, Lichtheim's sign, Truzzi's manœuvre, Oertel's cure, Gmelin's test, Babinski's fan, Gritti's operation, Grocco's triangle, Nicolaier's bacillus, the Vidal-Brocq type, Volkmann's deformity, the Walcher position, or Gram's stain; he may also possibly have forgotten that Basedow's, Graves', and Marsh's diseases are all synonymous with exophthalmic gôitre, and he might further possibly be puzzled if asked to explain the meaning of the words, "uranist" or "auto-transfusion." In all such cases he would find Garnier and Delamare's pocket dictionary of Medical Terms indispensable.

J. E. Nicholson,
Lieutenant-Colonel (*R.P.*).

Lexicum Medicum Polyglottum. By Dr. E. Laurent. Paris, 1906. Price 24 francs.

This Lexicon, whilst primarily intended for a Frenchman who is desirous of reading medical works in Latin, German, English, Italian, Spanish, Portuguese, or Russian, is also—thanks to the simple yet practical arrangement of its contents—very useful for ready reference by readers of other nationalities.

For those who are reading French, it is sufficient to look for the word of which they do not know the meaning in the *French* section of the Dictionary, as they will at once find its translation in Latin, German, English, Italian, Spanish, Portuguese, and Russian.

For those who are reading a work in a language other than in French, all that is necessary is first to look for the word not understood in the section allotted to the language to which the word belongs; after the word sought for is placed a number which refers to the French section, and the translation is at once obtained. As an example:—An Englishman (or a German, &c., &c.) understands *Spanish* and meets with the word "*Sarna*" of which he does not know the meaning; he first looks for it in the *Spanish* section of the Dictionary, where he finds the reference *87·11;* he now turns to page 87 of the French section, and then runs his eye down this page until he sees the Number 11; opposite this number he reads "Gale (French), Scabies (Latin), Krätze (German), Itch (English), Rogna (Italian), *Sarna* (*Spanish*), Ronha (Portuguese), Yecotka or Kopocra (Russian)." The reader has thus found out the meaning of the word he sought for. The same method is applicable to words in any of the other languages already mentioned. The edges of each section are differently coloured to facilitate reference.

There is also in the French section a complete list of all the diseases which bear the name of their discoverer. Example:—A person whilst reading comes across "*Loy's disease*" which he fails to recognise under that name; he looks up *Loy* in the French section and finds "Loy (maladie de), variole"; he then turns to the word *variole* in the same French section and finds its translation in his own language.

This book is of real service to medical men of all countries who are obliged to keep abreast with the advance of medical knowledge by reading professional works and journals in a language other than their own.

J. E. Nicholson,
Lieutenant-Colonel (*R.P.*).

Military Hygiene. By Robert Caldwell, F.R.C.S., D.P.H. London: Baillière, Tindall and Cox. Price 10s. 6d. net.

Lieutenant-Colonel R. Caldwell, R.A.M.C., follows up his Martin Prize Essay on the "Prevention of Diseases in Armies in the Field," by a work on "Military Hygiene."

In these days, when a knowledge of the principles of sanitation is so important, both for officers and men of the Army generally, no apology is necessary for the appearance of a work which, Lieutenant-Colonel Caldwell states, was written mainly with this idea in view, and accordingly apologises for its somewhat unscientific nature.

The result is a book which makes a somewhat difficult scientific subject comparatively easy for officers and men of the Army generally to understand.

The book has fifty-two useful illustrations on different subjects.

The chapter on Routine Duties, Lieutenant-Colonel Caldwell states, was written in the hope that it would be of use to junior medical officers of both the regular and auxiliary forces, and is a valuable one.

The results of the careful application of such principles as Lieutenant-Colonel Caldwell advocates are summed up in a chapter which includes Major Seaman's paper on "Japan's Care of Sick Troops," where it is stated the loss from disease was only 1 per cent.

Current Literature.

An Attempt to Classify the Hæmocytozoa.—By A. Laveran, *Bulletin de l'Institut Pasteur*, October 30th, 1905. Laveran states that in previous works he classified the *Hæmocytozoa* or endoglobular hæmatozoa into three groups, which appeared sufficiently homogeneous and characterised to constitute separate genera, viz.: the genus *Hæmamœba*, genus *Piroplasma* and genus *Hæmogregarina*, and that none of the many recent discoveries in connection with these parasites call for a modification of this grouping; also that the data concerning the trypanosomes and spirochætes are still too few and too indefinite for us to think of including them in the classification of the *Hæmocytozoa*.

(1) Genus *Hæmamœba*.—The hæmatozoon of malaria is the type of the parasites of this group, which may be defined as follows: Endoglobular hæmatozoa, generally pigmented, with an asexual (endogenous) form of multiplication, and a sexual (exogenous) form of reproduction, with flagella representing the male elements. *H. malariæ* and *H. relicta* accomplish many phases of their evolution in the Culicidæ, which are adapted for their propagation.

The following table gives the known species :—

Names of the Hæmamœbæ.	Hosts.
	(1) *Man. Mammals.*
Hæmamœbæ malariæ (three varieties, *parva*, *tertianæ* and *quartanæ*).	Pathogenic agent of malaria, only found in man; propagated by Culicidæ of the genus *Anopheles*.
H. Kochi	Monkeys.
H. melaniphera	Bats.
H. Vassali	Squirrels.
	(2) *Birds.*
H. Danilewskyi (Halteridium)	Birds.
H. relicta (Proteosoma)	Birds. The parasite is propagated by the Culicidæ.
H. majoris	*Parus major.*
H. Ziemanni	*Athene noctua*, &c.
	(3) *Tortoises.*
H. Metchnikovi ?	*Trionyx indicus.*
H. testudinis ?	*Testudo pardalis.*
	Saurians.
H. Simondi	*Hemidactylus Leschenaultic.*

(2) Genus *Piroplasma*.—*P. bigeminum*, the pathogenic agent of Texas fever, is the type of this group of parasites. By their morphology, which is simple, and by their method of multiplication (by bipartition), these endoglobular hæmatozoa differ notably from the *Hæmamœbæ* and the *Hæmogregarinæ*. They are not pigmented. The piroplasmata are propagated by the *Ixodidæ*.

The following table gives all the known species, and all of these have been observed only in mammals or in man :—

NAMES OF THE PIROPLASMATA.	HOSTS.
Piroplasma bigeminum	Bovines. Texas fever has been found in the five Continents.
P. parvum	Bovines. East Africa and Rhodesia.
P. canis	Dogs.
P. ovis	Sheep.
P. equi	Horses, mules, donkeys.
P. hominis ?	Man. Rocky Mountains.
P. Donovani (Leishmania)	Man. Asia and Northern Africa.

(3) Genus *Hæmogregarinæ.*—This group formerly included only the hæmocytozoa of cold-blooded animals, but nowadays several species of hæmogregarines have been found in mammals. The hæmogregarinæ when fully developed are seen as endoglobular vermicules, often bent back upon themselves or free and moving in the plasma. The existence of sexual forms has not yet been demonstrated; in any case, there are no male organs or flagella, as in the hæmamœbæ. The parasites are not pigmented. Their propagation is effected by means of ecto-parasitic blood-suckers, *e.g.*, leeches, ticks, &c.

The following list shows the known species (fifty-six in all):—

(To economise space, only the total numbers are here given.)

In mammals	2 species.
„ batrachians	11 „
„ tortoises	10 „
„ crocodiles	2 „
„ saurians	8 „
„ ophidians	11 „
„ fishes	12 „

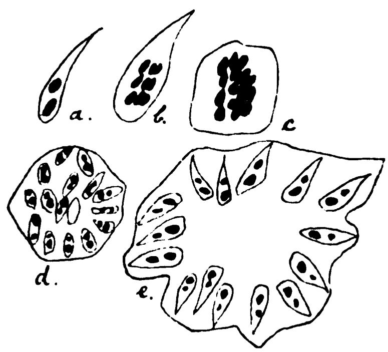
Remarks.—To the two hæmogregarines which are shown above as occurring in mammals there must doubtless be added the three *leucocytozoa*, found respectively in the blood of the dog, squirrel and mouse. In these cases, however, it is no longer a question of parasites in the red corpuscles, but of parasites of the white corpuscles.

The hæmogregarines of sea fishes are often associated with trypanosomes, and it is worthy of note that the existence of hæmogregarines has not hitherto been observed in fresh-water fishes, and that trypanosomes are commonly found in these latter.

J. E. NICHOLSON,
Lieutenant-Colonel (*R.P.*).

The Etiology of Small Pox, Foot and Mouth Disease, Scarlet Fever and Syphilis.—Dr. Siegel, of Berlin, has published three essays on these subjects, and in March of last year he gave an account of his investigations and their results to the Prussian Sanitary Council (*Medizinische Klinik*, 1905, No. 18). After alluding to the discovery by Ross of the plasmodium of malaria, he admitted that he was led thereby to the belief that the causes of certain acute exanthemata might be discovered by employing zoological methods. During several years he studied Zoology, and especially the Protozoa, under Professor F. Schulze, and then began to investigate the above-mentioned diseases. In all four parasites were discoverable, apparently belonging to the same species of Protozoa. Each closely resembles the others in development and morphology. They are designated *Cytorhyctes vaccinæ*, *C. aphtharum*, *C. scarlatinæ*, and *C. luis*, respectively. The young form is very characteristic; it is from ½-1 μ long, has a motile prolongation, and two nuclei enclosed in a

strongly refractile plasma. When stained with azur the nuclei become very prominent, but the plasma is quite invisible, so that the parasite seems much smaller. The nuclei increase in a characteristic manner, whereby the entire motile form becomes enlarged. Rows of nuclei appear and become more or less displaced and at different angles to each other. When they are about eight in number, the entire form, now measuring about $2\frac{1}{2}$-3 μ, more and more resembles a rounded disc, and loses its motility. Gradually in the interior rounded forms appear, similar to those above described; these show signs of motility, and eventually become free, after having caused the walls of the structure alternately to bulge out and retract. In successful preparations these forms can often be observed



DEVELOPMENT OF CYTORHYCTES (DIAGRAMMATIC).

a and *b*, motile forms. Progressive increase of nuclei, with change of shape and loss of locomotive power.

for hours, and stained while still living; the marked distinctness of the enveloping material then becomes obliterated, while the nuclei of the young forms become prominent. The impression is that the entire structure has suddenly shrivelled up and been reduced to half its size.

Up to the present time it has not been possible to classify as distinct species the parasites of these different diseases. But until the culture differences were observed, the same difficulty was experienced in the classification of bacteria; it still exists with regard to trypanosomes, notwithstanding the relatively large size of these organisms. On the other hand, there are great differences as regards the tissues affected by the parasites under consideration. In small-pox, forms described as Guarnieri's bodies were discovered in 1892; and these, according to Siegel's investigations, are the multiplication forms of the parasite. They invariably occupy the plasma of the epithelial cells. Thus he appears to have settled the much-disputed question as to whether these forms are parasites or only degeneration products of epithelial cells, with invisible parasites enclosed therein. It is sufficient to draw attention to the fact that multiplication forms of the parasite, hitherto undescribed, are discoverable in the blood.

The processes in foot and mouth disease markedly contrast with those observed in small pox and vaccinia. The multiplication takes place in the

epithelium, not, however, in the cell plasma, but in the interior of the nuclei. In scarlatina the parasites are found in the epithelial scales.

Lastly, in syphilis, which is in many respects analogous to the acute exanthemata, the multiplication of the parasites takes place in the connective tissue in and around the walls of the vessels. Many attempts have been made to inoculate small animals with syphilis, but hitherto without success. By making a small but effective alteration in the methods, Siegel has succeeded in producing blood infection and typical vascular disease in the iris; while parasites similar to those found in the human subject were discovered in the animals. Affections of the iris have been produced by inoculating, not only with an emulsion of scleroses and condylomata, but also with the blood of syphilitic patients and of rabbits, whose irides had been inoculated some weeks previously.

With regard to the methods employed, Siegel refers to his longer essays, and promises additional contributions as soon as his investigations have been completed. In the meantime, it seems worth while briefly to describe his methods of investigation and of inoculating animals with the syphilitic virus. For the former purpose he uses the blood of patients untreated, and in the acute primary stage, both living and film preparations, also the blood of infected rabbits. For sections, primary induration of the prepuce, broad condylomata, of the anal region, papulo-pustular diseases of the skin of inoculated monkeys, their internal organs, and affections of the skin and eyes of infected rabbits. Only very thin sections can be properly stained. The best materials for inoculation are non-ulcerated broad condylomata and primary lesions, prepared as follows: Portions of integument, 2-3 ccm. in size, were placed in a vessel with a like portion of a mixture of water and glycerine, equal parts, and cut up with fine scissors, until a milky emulsion was produced. Of this quantities not exceeding 1 ccm. were injected under the skin of rabbits, or a drop was introduced into the anterior chamber of the eye. The emulsion was used when fresh, and also after having been kept for some time; notable differences were observed in the effects, which diminished in proportion to the time. The emulsion of condylomata seemed more efficacious than that of primary sclerosis. Possibly the latter may contain more resting spores. Apparently no previous inoculations with syphilitic material have been made in a similar manner.

For staining both sections and film preparations, Siegel recommends as a preliminary, Grenacher's hæmatoxylin for a few minutes, according to the thickness of the object, decolourising with acid-alcohol, washing in distilled water, subsequent staining with Giemsa's azur ii., 1—1000 for two to five hours, a brief dipping in 93 per cent. and in absolute alcohol and xylol, then mounting in Canada balsam. The azur solution must be boiled before using and filtered through double folds of paper, in order to prevent fungi from appearing. For examining the preparations Siegel uses a Zeiss microscope, apochromatic oil-immersion, focal length 2 mm., and numerical aperture 1·40, generally with the apochromatic ocular 12, giving a magnification of 1,500.

For obtaining photograms of the parasites, Siegel recommends the use of ultra-violet light, which has been rendered possible by an apparatus designed by Dr. A. Köhler, a member of Zeiss' scientific staff. With this light the parasites appear smaller than when white light is used. Their absolute size is therefore much below that measured by the eye, or by the

aid of photograms hitherto employed. But the dissolving power of the objectives advances in direct proportion to any decrease in the wave length of the light used.

The reasons for regarding the parasites as Protozoa may be thus briefly stated: The two nuclei and the motile prolongations of the young forms are suggestive of the flagellata; the luminous plasma resembles that of the trypanosomes. As distinguishing them from vegetable cells there is no border resembling cellulose. The facility with which the nuclei can be stained, both in the motile and in the multiplication forms, distinguishes them from bacteria and fungi; besides, the ultra-violet rays constitute an excellent test for chromatin granules, which are absolutely impermeable. The fact that Cytorhyctes do not perish in glycerine and water proves nothing against the hypothesis that they are protozoa. The vitality of the plasmodium malariæ of man is not affected by its passage through the gastric, intestinal and glandular fluids of the anopheles, and similar instances might be adduced. The fact that syphilis is transmissible to rabbits will soon become familiar. Not long ago it was supposed that only men and cattle were liable to small pox; then monkeys were found to be inoculable, and, lastly, Guarnieri has shown that it is communicable to rabbits. The same change has taken place with regard to syphilis which was supposed to be confined to man; then anthropoid apes and monkeys were found to be liable. Now we know that rabbits, and likewise horses, are inoculable.

T. P. SMITH.

Fireless Cooking. — An article on the above subject appears in *American Medicine*, December 9th, 1905, which calls attention to this very little-known method of cooking, a knowledge of which might on certain campaigns or in places be most useful. It is stated that: "*Fireless Cook Stoves* is the somewhat misleading title of a report last February by Consular Clerk Geo. H. Murphy, at Frankfort, Germany, dealing with an apparatus described by Mrs. Back, wife of the director of the Industrial School in that city. It is well known that foods need not be kept at 212° F. to be properly cooked, for at moderate altitudes, where boiling takes place at less than 212° F., it is possible to cook foods. It was found also by experiment that it was not necessary to boil our foods for the long time we consider needful. If they were merely brought to the boiling temperature for a few minutes, and the pot then covered and removed to a closed box constructed with linings of hay or felt so as to retain all the heat, the cooking went on just as well, or better, than on the stove. Not only was there a corresponding saving of fuel, time and labour, less wear and tear of cooking utensils, fewer kitchen odours and less household cares, but most of the foods were found to be better cooked at this lower temperature, and presumably were softer and more digestible. Even roast or baked meats could be removed from the ordinary stove after being thoroughly heated, and the cooking finished in the 'hay box.' All covers being tightly closed, the aromas remained in the food, so that there was a distinct gain in flavour. The time required was, of course, somewhat longer than on the stove—varying from two to three hours—but the process went on without any attention, as there was no danger of burning. The whole process is so economical and efficient that it occasions some surprise to know that, though the

method was exhibited at the Paris Exhibition of 1867 as the 'Norwegian Automatic Kitchen,' and that though constant efforts to introduce it have been made ever since, no progress was made until quite recently, when it was taken up with enthusiasm in several of the Continental cities. It appears to be such a distinct advantage as to health and economy, that it deserves very general trial in America.

"*Fireless cooking in the Army* has been described in the last report of the Commissary General. As early as last April Murphy's report was taken up, and the method given a series of trials at the Army Cooking School at Fort Riley, Kansas, and also in New York. Though the apparatus was crude, the results were highly successful. More elaborate experiments are to be made in the immediate future. The Commissary General even says that there is no question as to the superiority of this method of cooking in comparison with the old, not only from the retention of the aroma, but from economy of fuel. It is easily seen that, as fuel is always scarce in the field, the system should find immediate favour if a fire for only a few minutes will supply enough heat to cook a Company dinner. Indeed, it is found that the articles can be heated in the morning just before camp is struck, placed in the boxes, which are loaded on the waggons, and the self-cooking continued on the march. As soon as the new camp is reached the boxes are opened, and a hot dinner is ready at once. It was at first thought that the apparatus would be too heavy and cumbrous for practical purposes, but such defects will be remedied in time if the system is all that is claimed for it."

The Action of a Serum on Trypanosoma gambiense which is specific for Trypanosoma brucei.—In the *Zeitschrift für hygiene und infectionskrankheiten*, Band 52, 1905, Kleine and Mollers give the results of their observations on this subject. They introduce it by stating that the starting-point of their work was the observation by R. Koch that cattle, and perhaps donkeys, which had been treated with attenuated parasites (obtained by passage through suitable animals), could be protected from death after an injection of fully virulent material. The blood of these animals after a certain time develops protective bodies, which can only be demonstrated when the serum is mixed with the parasites and injected into animals. The mixture is then found to be no longer capable of infecting them. The authors adopted the following method of increasing the activity of the specific substances:—They had two donkeys previously treated by Koch's method, and which showed fairly well-marked immunity. Then large white rats were injected intraperitoneally with 1 ccm. of blood containing many trypanosomes. When the trypanosomes appeared in the blood of the rats, and were as numerous as the red corpuscles, the rat was bled. The blood was defibrinated and an equal quantity of serum from the treated donkey was mixed with the blood. The red corpuscles sank to the bottom of the vessel, whilst the serum and the trypanosomes remained on the top. The scum was carefully poured into another vessel. This was allowed to stand for two hours. The authors believe that in this way the trypanosomes were clumped and were more readily dissolved on subsequent intravenous injection into the donkeys. The donkey received four injections at intervals of fourteen days. As a rule they used 30 ccm. of serum,

which contained the living parasites derived from the blood of four large rats.

The maximum activity of the specific substances was obtained after the second injection. They found that a dose of 0·5 ccm. given subcutaneously protected mice that were subsequently injected with a 0·2 ccm. of a suspension of trypanosomes in blood (one parasite in three fields of the microscope, oil immersion). The controls died in four to five days. When the same dose of serum was given twenty-four hours after the infection, it was found necessary to repeat the injection to prevent the death of the animal. Even by this procedure, however, it was found impossible to save animals in whose blood the parasites were found in greater numbers than one or two in the field. The life of a dog treated in the same way was only prolonged for ten days. The history of the donkeys is interesting. The treatment was begun in one case on February 2nd, 1905, and in the other on March 17th, 1905. They died respectively on May 30th, 1905, and June 24th, 1905. Trypanosomes were never found in the blood on microscopic examination, but they appeared in the blood of a dog after injection of 20 ccm. of the blood of the donkey. The authors state that the death was caused by a chronic intoxication which the weakened tissues could not overcome. After these experiments they tried the effect of the serum on *Trypanosoma gambiense*. The result of all their experiments showed that the subcutaneous injection of donkey's serum specific for *T. brucei* did not protect mice injected with *T. gambiense*. They arrive at the conclusion, therefore, that there is a distinct difference in the action of the serum on *T. brucei* and *gambiense*, and in this way they differentiate the two trypanosomes.

They add a very important note, which is given *in extenso*; and it is with pleasure that we observe that the true facts connected with the etiology of sleeping sickness are so clearly realised in Germany. It is to be hoped that writers on this subject will take note of it.

NOTE.—"It may be observed here that it was *not* Castellani who discovered the etiological relation of trypanosomes to sleeping sickness. One might arrive at this erroneous conclusion by a study of Castellani's own writings (*Die Ætiologie der Schlafkrankheit der Neger*, *Centralblatt für Bakteriologie*, 1904, Bd. xxxv., Nr. i.), whilst other publications put an entirely different complexion on the subject. In volume iv. of the 'Report on Sleeping Sickness' (Royal Society Reports of Sleeping Sickness Commission, Bruce, Nabarro and Greig, London, November, 1903, No. iv.) it is stated on p. 5: 'Dr. Castellani had observed these hæmatozoa in the cerebro-spinal fluid of five cases of sleeping sickness, and in one he had also seen them in the blood. At the time of the arrival of the Commission he did not consider that this trypanosoma had any causal relationship to the disease, but thought it was an accidental concomitant like *Filaria perstans*. When he reported his observation to Lieutenant-Colonel Bruce, the latter was much struck by this discovery, and urged Dr. Castellani to pursue this point during his few remaining days at Entebbe."

Castellani at first ascribed the cause of sleeping sickness to a streptococcus ("Etiology of Sleeping Sickness," *British Medical Journal*, March 14th, 1903). The *rôle* which he ascribed to the trypanosome was, probably, in part explained by the fact that Dutton (*The Journal of*

Tropical Medicine, December 1st, 1902) and Forde (same, September 1st, 1902) had found such a parasite in man who was not suffering from sleeping sickness. On March 16th, 1903, Bruce arrived in Entebbe. Castellani's paper to the Royal Society in which the trypanosome is described as the cause of sleeping sickness is dated April 5th, whilst the dates (Royal Society Reports of the Sleeping Sickness Commission, London, August, 1903) of the individual finds (up to Bruce's arrival) are November 12th, 1902; December 15th, 1902; December 22nd, 1902; January 23rd, 1903; February 27th, 1903; and March 2nd, 1903. From this there cannot be any doubt that the chief merit of this important discovery is to be ascribed to D. Bruce. Since it has been shown that the parasite seen by Castellani is identical with the older *T. gambiense*, Dutton, it is recommended, as Laveran and Mesnil (*Trypanosomes et Trypanosomiasis*, Paris, 1904) have suggested, that all other names should be dropped and this one retained.

E. D. W. Greig.

Immunity and the Etiological Treatment of Syphilis.—The Vienna correspondent of the *Medical Record*, New York, writes under date Vienna, November 20th, 1905, as follows:—

"Dr. Rudolph Kraus has made interesting studies in the official institute for serotherapy in Vienna, on immunity and the etiological treatment of syphilis. Observations on monkeys have served to confirm the conclusions of Metchnikof and Roux that syphilis is transmissible to animals. A noteworthy observation is the fact that the initial lesion is transmissible, no matter whether it is pustular or in the form of a chancre, and each type preserves its own form on inoculation. The initial lesion produces, as many observations have shown, a cutaneous immunity, but specific precipitins are not formed. The foundation for the attempts at etiological treatment, and the allied studies relative to immunity in syphilis, are based on Pasteur's protective inoculation against hydrophobia. It appeared not unlikely that by means of active immunisation with syphilitic virus the secondary manifestations, that is, the general infection, might be prevented, just as the development of rabies is avoided in animals infected with that disease. By immunisation with the virus of hydrophobia immune bodies are formed in the already infected organism, and in consideration of the long period of incubation existing between the appearance of the syphilitic chancre and the secondary lesions, it seems possible to produce immunity in a similar way by the subcutaneous administration of syphilitic virus. The patients that were treated in that way all exhibited what, clinically, were undoubted primary lesions. With the patients' consent they were treated for fourteen days with subcutaneous injections of an emulsion of excised triturated human chancres. Of thirteen patients treated in this way, during the intermediary stage of syphilis eight developed the disease in the customary manner, five of them showing the usual lesions of secondary syphilis six to eight weeks after infection, while in three cases the secondary symptoms did not appear until three and a half months after the infection. In five cases, in spite of observation continued through several months, no evidence of a general infection could be discovered. Although no definite conclusions may be drawn from these

results, they are, according to the views of prominent clinicians, of great interest, as the various measures that have so far been experimented with in this stage of syphilis, such as prophylactic mercurial treatment or excision of the chancre, have not prevented the appearance of the secondary lesions. Observations on monkeys intended, by means of active immunisation, to prevent subsequent cutaneous infection were negative, the monkeys developing typical primary lesions. Similar results have been reported by Metchnikof, Roux, Neisser, and Baermann. These experiments lead to the conclusion that active subcutaneous immunisation is not available to protect against subsequent cutaneous infection, but it is possible that by this means the general infection might be prevented. It is also certain that a cutaneous immunity is produced by cutaneous infection, for both in monkeys and in man one chancre prevents further cutaneous infection. Further experiments along these lines are in progress, and should they lead to successful results they would open the way not only to an etiological therapy, but also to an etiological prophylaxis. By subcutaneous active immunisation a post-infectional protective inoculation could be carried out similar to that against hydrophobia, and by a cutaneous inoculation with an attenuated virus a preventive procedure similar to that with vaccine virus could be obtained."

Correspondence.

BILHARZIOSIS IN SOUTH AFRICA.

TO THE EDITOR OF THE "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

SIR,—I have been much interested in reading of late various papers in your Journal by officers who have had unique experience of treating cases of British officers and soldiers who contracted bilharziosis in South Africa.

May I crave the courtesy of your columns to try and get a little further information from them? I have had some experience of the disease in Egypt and South Africa, but there are some points which cannot be settled so long as the patients continue to live in an endemic area.

(1) I shall be grateful for any light thrown upon the incubation of the disease, which seems to vary from about four to six months. Some of your readers can perhaps settle this question by telling us of cases which developed their first symptom, such as hæmaturia, either on the voyage home from South Africa or after arrival in England. Of course, no case can be considered certain until the well-known eggs have been discovered in the urine or fæces.

(2) I have read the cases reported by Major Freeman and Major Faichnie, and I should be interested to hear of any other instance of the spread of the disease in a non-endemic area from an imported case.

(3) The duration of the disease after removal from an endemic locality, such as Egypt or South Africa, seems to vary from three to eighteen years, so that any information upon this point would be of great value to us. I suppose it must be conceded that a patient is not cured until he has lost all symptoms of the disease, including the presence of eggs in the urine or fæces, even after riding, running, bicycling or walking long distances.

I need not say that I shall be very grateful for any assistance.

Yours truly,

F. M. SANDWITH.

31, *Cavendish Square, W.*
January 7th, 1906.

In connection with the above letter, Lieutenant N. E. Harding, R.A.M.C., records the following case:—

No. 6304 Private M. Kitchen, 1st East Yorkshire Regiment, aged 22, was admitted to the Station Hospital, Shwebo, on March 18th, 1904, complaining of blood in the urine and pain in the urethra at the end of

micturition. On microscopic examination, the characteristic ova of Bilharzia hæmatobia were readily found in the urinary sediment.

Previous History.—He served in South Africa, from February 8th, 1902, to December 5th, 1902, and after that at home till December, 1903, when he embarked for India. On arrival at Shwebo, January 28th, 1904, he, in common with all other men in the draft who had served in South Africa, was questioned as to any urinary symptoms, but both then and afterwards in hospital absolutely denied the existence of any until two days before his admission. His medical history sheet also shows no entry ascribable to the above parasite.

Remarks.—Accepting his story as true the case seems to be of interest as showing how long the period of incubation may be, as I suppose the idea of his having contracted the disease either at home, or India, or Burma, may be dismissed, and it is hardly credible that a man could have been suffering from hæmaturia and the irritation caused by the passage of the ova without being aware of it.

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Original Communications.

THE MEDICAL ORGANISATION OF THE JAPANESE ARMY.

By LIEUTENANT-COLONEL W. G. MACPHERSON, C.M.G.,
Royal Army Medical Corps.

THE Handbook of the Medical Organisation of Foreign Armies and the various notes that have recently appeared in this and other journals on the subject of the Japanese military medical organisation, contain statements that no longer hold good, and that are, in several instances, contradictory. It is with a view to giving a more correct account than can be obtained from these documents that the following notes have been prepared for publication, at the request of the Director-General of the Army Medical Service.

ADMINISTRATION OF THE MEDICAL SERVICE.

The Director-General of the Army Medical Service in Japan (*Rikugun-i-mu-kyoku Cho*), ranks as a Lieutenant-General and is directly under the Minister for War. He is responsible for expenditure on medical services, preparation of estimates, and general efficiency of the medical services. He prepares a report on the health of the Army, which is published annually. His office is divided into two branches, each under the control of an officer of the rank of colonel. The first branch deals with questions of *personnel*, hygiene, statistics, professional and scientific subjects and voluntary aid; the second branch with medical and surgical supplies,

hospitals, transport of sick and wounded, mobilisation and cognate subjects. Four officers of the medical service are attached to each branch, two forming the regular staff, and two being attached as extra staff during war, usually from the staff of the Army Medical School, which is then closed.

The administration of the medical services of the military districts[1] throughout Japan is carried out by Principal Medical Officers of Divisions (*Shidan Gun-i-bu Cho*), who are attached to the Headquarter Staff of the Divisions.

The Principal Medical Officers of divisions usually rank as colonel, but in peace time a certain number of surgeon-generals is maintained by having a surgeon-general as principal medical officer of at least three of the territorial divisions. In war the principal medical officer of a division is also a colonel, but the appointment may be held by an officer of the rank of lieutenant-colonel.

When divisions are mobilised to form an army in the field a principal medical officer is appointed as Principal Officer of the Army (*Gun Gun-i-bu Cho*). His rank is surgeon-general (major-general). Thus, in the Russo-Japanese War there were four or five surgeon-generals in the Field as principal medical officers of the several armies.

The administration of the medical services on a Line of Communication is in the hands of a medical officer who ranks as colonel, and who is on the staff of the Inspector-General of the Line of Communication. Each field army would have its own Line of Communication, and there would accordingly be as many Principal Medical Officers of Lines of Communication (*Heitan Gun-i-bu Cho*) as there are field armies. As the Lines of Communication of field armies might at times converge into one general line, there would be an additional principal medical officer for that

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[1] Japan, it may be mentioned, is divided into twelve military districts based upon a territorial system. There are thus twelve divisions, each numbered according to the district to which it belongs, in addition to one division of Guards, which is stationed in the capital and which belongs to no territorial district. The whole of the Japanese military organisation is based upon the divisional units, each being complete in itself, not only as regards combatant troops, but as regards all auxiliary services, including the medical services. An army can thus be placed in the field complete in every respect, by mobilising one division only, as was the case at the time of the Boxer troubles, or, as in the case of the recent Russo-Japanese war, by mobilising as many divisions as are necessary to form armies in the field, consisting of one or more divisions each.

line, but such a line would usually come into the command of a garrison of occupation, and no longer form a portion of the field army.

In addition to the administrative control of the medical services in the field, as represented by the principal medical officers of armies, divisions, and lines of communication, a Principal Medical Officer of the Field Forces is appointed as head of all the field medical organisation. He has authority over the principal medical officers of field armies, as regards professional duties, and his place is on the General Staff at Headquarters in Tokio. The appointment of Principal Medical Officer of the Field Forces (*Yasen Eisei Cho Kan*) does not, of course, exist in time of peace, and is usually taken up on the outbreak of war by the Director-General of the Army Medical Service for the time being. This, at any rate, was the case during the recent war, and the Director-General then had his office as Director-General in the War Office, and another office as Principal Medical Officer of the Field Forces in the General Staff. He also paid visits of inspection to Manchuria, in some cases for prolonged periods. His duties, besides those of general supervision of the work of medical services in the field, dealt generally with the medical details of the Lines of Communication in the home territory and the distribution of sick and wounded returning from the front.

All Principal Medical Officers have two medical officers on their Staff as secretaries or assistants. This applies to divisional principal medical officers as well as to principal medical officers of armies. They have also a staff of clerks, which usually consists of three senior non-commissioned officers of the medical service. The staff of a Principal Medical Officer is, however, somewhat elastic, and he can add to it under special circumstances.

There are no administrative medical officers of brigades. The senior medical officer of regiments, of which the brigade is composed, would in case of necessity act as such.

It may be noted that during the recent war there was no Principal Medical Officer on the Staff of the Commander-in-Chief in the Field. The administrative and advisory duties of such an officer were performed by the Director-General of the Army Medical Service acting as Principal Medical Officer of the Field Forces, who worked with the General Staff in Tokio and visited the field from time to time.

When a division is mobilised and joins a field army the whole of the peace staff is mobilised at the same time and accompanies

it into the field. Their place is taken by general or other officers of the reserve, who are, as a rule, officers of distinction on the retired list. In this way the medical service of the Depôt Division, as it is called, is administered during war by a medical officer, retired from the army, with the rank of surgeon-general or surgeon-colonel.

Medical Service with Units.

The medical charge of the Headquarter Staff of armies and divisions is held by one or other of the assistants or secretaries of the Principal Medical Officer. Sometimes the work is shared, the Principal Medical Officer having full power to assign to his assistants such duties as he thinks fit. A special medical officer is attached to the Headquarters of the Commander-in-Chief for the medical charge of that officer and his staff. These medical officers have charge of the escort and followers of their respective headquarters, and perform the duties of sanitary officers for the locality in which the headquarters are situated.

The duties of medical charge of a brigade Headquarter Staff are performed by a medical officer from the nearest battalion.

The rank of the assistants or secretaries of Principal Medical Officers is usually captain or subaltern, and the junior may be an officer from the reserve. The Principal Medical Officer of a line of communication, however, has frequently an officer of the rank of major as his senior assistant and may have two others of more junior rank attached to his office.

The medical charge of regimental units is held by medical officers of rank below that of field officer. Each battalion of infantry has two medical officers, and smaller units, such as a battery of artillery, have one medical officer each. Thus, a regiment of infantry, which consists in the field of three battalions, has altogether six medical officers; a regiment of artillery, consisting of three batteries, three medical officers; a regiment of cavalry, consisting of two squadrons, two medical officers; a battalion of engineers, including a telegraph company, three medical officers (two for the battalion and one for the telegraph company), and so on. A battalion of the train (transport) has three medical officers, and an ammunition column five, thus allowing for one medical officer to sections or companies of these units. All medical officers of units are mounted.

In addition to the medical officers with the battalions of

infantry and other units, there is a staff of non-commissioned officers of the medical service in proportion of one to each company, in addition to a senior non-commissioned officer, who acts as chief assistant to the medical officers in the preparation of returns, care of medical and surgical equipment, and so on. Each carries a field medical companion, or surgical haversack, which has a compartment for splints, and also an Esmarch's elastic tube torniquet, which is carried *en banderole* or round the waist. In the smaller units, such as a battery of artillery, company of engineers, regiment of cavalry, there is one non-commissioned officer of the medical service with each medical officer.

The medical officers with units form regimental infirmaries or sick rooms (*Rentai Byo-sha*) in encampments or cantonments, and relief or aid stations, temporary regimental or battalion dressing stations, during an action. They have sanitary charge of the locality where their unit is stationed, including villages in the vicinity which are not occupied by other units. Their equipment consists of four medical panniers, two of which go with the first line and two with the second line of regimental transport.

The medical officers, of infantry battalions only, have also a staff of regimental stretcher-bearers. Each company[1] is obliged to have four men trained in first aid to the wounded, and in the carriage of wounded by stretchers or by improvised means. These form the regimental stretcher-bearers, and they are called technically "assistant stretcher-bearers," to distinguish them from the stretcher-bearers of the divisional Bearer Battalion. During an action they are all placed under the medical officers of the unit, and, on the line of march, march in the rear of their battalion, carrying their rifles.

It will be noted that they number sixteen for each battalion. There is one stretcher to every four bearers, a stretcher squad being formed of four bearers. These assistant bearers do not wear the Geneva Convention brassard. They wear instead a narrow red band tied round the right upper arm. In this respect the Japanese follow closely the custom of European armies, in which the regimental stretcher-bearers have a special stretcher-bearer armlet instead of the Geneva Convention brassard. Their function, of course, is to convey the wounded of their own battalions to the battalion or temporary dressing stations, or to any other spot

[1] (The Japanese company of infantry is practically double the strength of ours a battalion having four instead of eight companies.)

appointed by the battalion or regimental commander. They are never employed behind that line. They are usually accompanied in the performance of their duties by the company medical non-commissioned officer. The battalion medical officers seldom go beyond their own dressing stations, although they would proceed into the fighting ranks if ordered to go there in connection with any special case.

FIELD MEDICAL UNITS.

The Medical units in the Field are as follows, arranged in order of echelon from front to base :—

(1) Bearer Battalions.

(2) Field Hospitals (Cantonment Hospitals, Rest Stations, Infectious Diseases Hospitals).

(3) Reserve Medical Personnel (Stationary Field Hospitals, Rest Stations, Infectious Diseases Hospitals).

(4) Sick and Wounded Transport units (Rest Stations).

(5) Medical and Surgical Reserve Depôts.

(6) Line of Communication Hospitals (Infectious Diseases Hospitals).

(7) Hospital Trains.

(8) Hospital Ships.

(9) Military Quarantine Stations.

(10) Reserve Hospitals (Infectious Diseases Hospitals).

(11) Fortress Hospitals (Infectious Diseases Hospitals).

(1) *Bearer Battalions.*

The Bearer Battalion (*Eisei-tai*), is the unit noted in the Handbook as the "Medical Staff Corps."[1] It is a divisional unit, that is to say, each division has one bearer battalion. It consists of:—

(*a*) Two stretcher-bearer companies (*Tanka-Chu-tai*).

(*b*) A dressing station section (*Eisei-tai-Hom-bu*).

The latter is what is described in the Handbook as the "centre." The command of a bearer battalion is held by a major of infantry, or train. In fact, he is interchangeable with infantry fighting units. For example, while the battle of the Sha-Ho had scarcely been decided, the officer commanding the bearer battalion of one of the Japanese divisions was transferred to command a bat-

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[1] This is a misnomer, and probably a translation of the continential term for a bearer company. "Bearer Battalion," although not an exact translation of the Japanese term, *Eisei-tai*, gives a better conception of the unit.

talion of infantry in the trenches. Two other infantry or train battalion officers belong to the battalion. They rank as captains or subalterns, one being in command of No. 1 Company, and the other in command of No. 2 Company. There are no medical officers, non-commissioned officers, or men of the medical service in the composition of the bearer companies. They are companies of stretcher-bearers only. Each is composed of forty stretcher squads, or 160 bearers, obtained from infantry reserves, with additional *personnel* for auxiliary services, such as cooks, horse attendants, servants, &c., a bugler, shoemaker, saddler, tailor and shoeing smith. According to the regulations, one of the bearer companies is intended to convey the wounded, during an action, from the regimental fighting lines or temporary dressing stations (*Kari-Ho-tai-jo*), to the bearer battalion dressing station (*Ho-tai-jo*), and the other company to convey them from the latter to the Field Hospitals.

The Dressing Station section is described in the Japanese regulations as the headquarter section of the bearer battalion. The officer commanding the battalion, non-commissioned officers as clerks and cooks, an intendance officer and non-commissioned officer, and train non-commissioned officer, drivers and grooms, belong to the headquarter section; but otherwise it is composed entirely of officers, non-commissioned officers and men of the medical service. The number of medical officers in this section is eight, two being of captain's rank and the remainder subalterns. The senior medical officer has command of the section as regards dressing station arrangements. The rest of the *personnel* consists of one apothecary, with officer's rank, a staff of senior non-commissioned officers for charge of the medical and surgical material and clerical work, and junior non-commissioned officers for assisting the medical officers, and attending to the patients. There are no privates of the medical service in a bearer battalion.[1]

The battalion is divisible into two identical halves, which are able to work independently of one another. During the recent war it was unusual to find the bearer battalion of a division working in any other way than as two half battalions.

The *personnel* of a bearer battalion, whether they belong to the medical service or not, wear the Geneva Convention brassard. The medical officers, the battalion and company officers, and the

[1] The full details of the *personnel* of the various units in the field must be omitted in this paper. Such details are not divulged by the Japanese authorities.

non-commissioned officer in charge of the transport *personnel* are mounted. The stretcher-bearers are soldiers of the reserve who have been trained as assistant stretcher-bearers, and have served as such with the colours. None of the dressing station section, that is to say, no member of the medical service, accompanies the squads into the field. They all remain during an action at the dressing station. The whole of the equipment, which consists of two identical sets of eight panniers each, with stretchers, cooking utensils, &c., is carried, as a rule, on pack horses or ponies, about forty in number. It may, however, be carried in one-horse general service waggons, in which case twenty-four waggons take the place of the forty pack animals. Additional medical and surgical material is carried in field medical companions, one with each non-commissioned officer of the medical service, and in surgical haversacks, one of which goes with each stretcher squad.

When the dressing station opens, whether it opens as a whole or as a half section, it invariably forms four departments, each department being distinguished by placards of different colours. These departments are: (*a*) The admission and discharge department, distinguished by a navy-blue placard; (*b*) the department for serious cases, distinguished by a white placard; (*c*) the department for light cases, distinguished by a red placard; (*d*) the apothecary's department, distinguished by a black placard.

All wounded brought into the Dressing Station are first seen in the admission and discharge department, where the identification particulars (name, regiment, battalion, company) and the nature of the wound are entered in an admission book. The wounded are then passed on to the serious case or to the light case department, according to the nature of the case. As a rule, this is determined already by the medical officers of the fighting unit, who affix a white diagnosis tally for the former and a red for the latter class of case. Two medical officers attend to the dressing of each case in the serious case department, and one in the light case department, that is to say, when the bearer battalion is working as a half battalion. When it works as a whole battalion there will be four medical officers in the serious case department, and two in the light case department. The remaining two medical officers of the battalion belong to the admission and discharge department. When there is an excessive number of casualties, medical officers of battalions, batteries, engineer companies or other units in the vicinity may be called in to assist, if they are not otherwise engaged.

As a rule all the wounds are re-dressed in the bearer battalion dressing station. Light cases able to walk are sent back at once to a field hospital. More serious cases are kept until suitable transport has been got ready. Cases which it is not advisable to move under any circumstances, are usually left until some field hospital comes up and takes them over.

The arms and accoutrements of the wounded are received at the dressing station by the admission and discharge department, and labels are attached to each article, with the particulars of the patient to whom it belongs. Money and valuables are also received here and entered in special books prepared with foils and counterfoils for this purpose. All the articles so labelled and entered accompany the patient wherever he goes, but the arms and accoutrements are handed over at the nearest station on the line of communication, if the patient is not likely to recover within a short period of time.

A report of the work of the bearer battalion is submitted immediately after each engagement in the form of—

(*a*) A Dressing Station report, and

(*b*) Bearer Companies' reports.

These reports must enter into complete details of the work done, the nature of the locality, condition of roads, condition of transport material, and similar facts.

(2) *Field Hospitals.*

The Field Hospitals (*Yasen Byoin*) of the Japanese Army are divisional units. The organisation provides for six field hospitals with each division, but during the recent war no division had more than four field hospitals, and some had only three or two. Field hospitals may be opened during an action, after an action, or during a period of more or less inactivity in the field. Each is divisible into two halves identical with one another, both as regards *personnel* and equipment.

The field hospitals are designated as No. 1, No. 2, No. 3, or No. 4 Field Hospital of No. —— Division and the sections as the "first half" or the "second half" of No. —— Field Hospital. During an engagement the disposal of the field hospitals rests with the Principal Medical Officer of the division in consultation with the Chief of the Staff, who issues the necessary orders. As a rule, they are not all opened at once, but only as required during the progress of the action. Thus, at the commencement of an

action, where possibly only some outpost skirmishes take place, and where the casualties are few, one half field hospital only may be moved up and opened in the vicinity, the rest remaining in reserve. As the action progresses, other half hospitals or whole hospitals may be brought up to the neighbourhood of the localities where the severest fighting is taking place, but it is not until the result of the action is decided and the day lost or won that all the field hospitals of a division are likely to be found open. The Principal Medical Officer endeavours to have one or more in reserve until the last. In some divisions it was the practice of the principal medical officers to open one half only of each of their hospitals, keeping the second half in reserve. There is no rule as to which should be opened first. All depends upon the nature of the fighting and of the locality. For example, No. 4 Hospital might be opened long before No. 1.

The medical and auxiliary *personnel* and equipment of a field hospital are organised for the treatment of 200 wounded at one time, and reserve rations both for the *personnel* and patients are carried with it. The command of a field hospital is held by the senior medical officer, who ranks as a major. He has under him five other medical officers of captain's or subaltern's rank, one apothecary, an intendance officer or warrant officer, and a senior non-commissioned officer of the train (transport) battalion. It may be stated generally that the *personnel* of a field hospital is composed not only of non-commissioned officers and men of the medical service, but also of horse attendants and drivers of the train battalion, shoeing smith, saddler, tailor, shoemaker, instrument repairer and cooks. All the medical officers and the senior non-commissioned officer of the train battalion are mounted.

A field hospital contains no transport material for sick and wounded, beyond a few stretchers, the number of which is indefinite. The number of panniers with medical and surgical equipment is twelve, namely, two sets of six panniers identically equipped. There are also eight packages containing bedding and clothing for patients, the latter consisting of a Japanese bed-gown and waist belt. Tents may be carried, but the number depends entirely upon circumstances. Thus the field hospitals in Manchuria had four tents only, chiefly for use as offices, reception or operation rooms. The village houses supplied the necessary ward and other accommodation. The equipment can be carried on pack-animals or in transport waggons. No special form of waggon is

used, the Japanese one-horse general service waggons being invariably employed.[1]

The chief duties of a field hospital are to receive the wounded from the fighting line, and from the divisional dressing stations, examine and record the wounds, carry on whatever treatment is necessary as a temporary measure, including necessary surgical operations, and then prepare for the transfer of the patients to the rear. For the last purpose the intendance officer is required to collect country carts, horses, coolies, &c., whenever necessary, but the field hospital establishment has no concern, as will be shown later on, in the actual carrying of the patients.

In opening a field hospital during an action a site will be selected as near the divisional dressing station as possible, one that is out of range of fire, easily reached, and with facilities for the transport of wounded. Road indicators must be put up if the site is concealed, or if the way to it is likely to be missed.

The field hospital (or half-field hospital) is required to open in distinct departments for carrying on its work, namely, administration department, department for the admission and discharge of patients (that is to say, for keeping statistical records, arms, accoutrements, money and valuables, &c.), the wards, operation room, apothecaries' department (for the packing, unpacking and issue of medical and surgical material), kitchen, ablution department, mortuary, disinfection department, stables, and waggon park. The wards are further sub-divided into sections according to the nature of the diseases and wounds.

The Japanese field hospitals are exceedingly mobile units and must advance and retire in conformity with the movements of their division. The organisation of the various departments, therefore, is such that each has its own fixed *personnel* and there is no over-lapping of work or confusion.

Each time a field hospital closes and moves on to another site, or transfers its patients bodily to the Reserve Medical Personnel (see below), a report is transmitted to the Principal Medical Officer of the division, giving descriptions of the locality, the buildings occupied, the statistical reports of patients admitted, transferred, &c., a nominal return of operations performed, a statement of the medical and surgical material and supplies received and expended,

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[1] During the battle of Mukden, when additional supplies of clothing and blankets went with the field hospitals, a number of country carts was added temporarily to their transport.

the ranks and names of medical officers, including any from other units who may have taken part in the work, and any other points of interest or importance.

When a division is on the march and there is an accumulation of sick and foot-sore that are unable to march with the troops, a section of a Field Hospital or a whole Field Hospital may be ordered to open temporarily and form "rest stations" (*Ryo-yo-sho*) for these cases, taking care of them until they are sent back to a stationary field hospital or line of communication hospital. When the division is cantoned, during a period of inactivity, one or more field hospitals may be opened as a cantonment hospital (*Sha-ei-Byoin*) for the division. When this is the case the Hospital will be designated, not as "No. —— Field Hospital of —— Division," but as the "Cantonment Hospital of —— locality." It will receive, in other words, the name of the village or town in which it is opened, and it is laid down in the regulations that, when a rest station or cantonment hospital is opened in this way, local hospitals or other suitable buildings will be taken up for the purpose and their situation noted on a placard fixed at the entrance of the town or village, in the public square or at the railway station, the direction being indicated if necessary by road indicators.

Field hospitals, opened as cantonment hospitals, will carry on continuous treatment of patients who are likely to recover within a short period of time. Others, if they are able to bear transport, will be sent back as soon as possible to the Line of Communication hospitals, and for this purpose the officer in charge will keep in touch with the Sick and Wounded Transport Department (see below) and with the Headquarters of the Line of Communication. When the division moves on, the cantonment hospital will remain behind until its patients have all been sent back or handed over to a relieving Reserve Medical Personnel and will then rejoin the division. As a rule, a divisional move is anticipated and the hospital is evacuated or relieved before it takes place.

(3) *The Reserve Medical Personnel.*

The Reserve Medical Personnel is a unit organised to follow up the field hospitals during an action, to form Stationary Field Hospitals at suitable spots for the purpose of relieving them, and to arrange rest stations along the route of evacuation. It is intended to be equivalent, both in *personnel* and equipment, to three field hospitals. In addition to its main function, which is that of

opening stationary field hospitals (*Senchi-tehritsu-Byoin*), during and after an engagement, the unit may be required to take part in the work of the line of communication hospitals and of the Sick and Wounded Transport Department during periods of inactivity. A Reserve Medical Personnel unit is divisible into three identical sections, and each division mobilises one such unit, which is placed under the line of communication command of the army to which the division belongs. Thus an Army consisting of three divisions would have on its line of communication three Reserve Medical Personnel units, the distribution of whose work would be in the hands of the Principal Medical Officer of the line of communication, in consultation with the Inspector-General of the line.

In opening stationary field hospitals, the unit would select a spot two or three miles behind a group of field hospitals, so as to collect the wounded from each hospital in the group; or a section of the unit might be sent forward to relieve a field hospital on the spot where the latter had originally opened, and form there the nucleus of a large stationary field hospital.

One duty of the Reserve Medical Personnel, in moving up to take over the work of a field hospital, is to supply deficiencies in the medical and surgical equipment of the latter, as far as possible. For this purpose it has three sets of two panniers each, which are identical with two of the field hospital panniers. The unit has, in addition, three other panniers identical with one another, and an indefinite supply of material obtainable from the line of communication, or medical and surgical reserve depôts.

The unit is under the command of a medical officer of the rank of major. There are twelve other medical officers, three apothecaries or compounders, and an establishment of non-commissioned officers and men of the medical service, intendance and transport establishments, and *personnel* for special duties. The medical officers and transport non-commissioned officers are mounted. The unit forms a link between the mobile field hospitals and the fixed hospitals on the line of communication, as the stationary field hospital, although mobile, is at the same time intended to remain for a more or less prolonged period in one spot, and is not fully equipped with mobile surgical and medical material.

When a stationary field hospital opens in any locality it is designated by the name of the locality, in the same manner as cantonment hospitals.

(4) *The Sick and Wounded Transport Department.*

This unit is also a Divisional unit, that is to say, each division mobilises one Sick and Wounded Transport Department unit (*Kanja-Yuso-Bu*). The duty of the department is to carry out the transport of sick and wounded during the process of evacuation from the front, within the sphere of the rear of the field army and on the line of communication as far as the rail-head. Each unit is organised under the command of a major, usually from the retired or reserve list of infantry or train, and has three medical officers, a small staff of non-commissioned officers of the medical service and a small equipment of medical and surgical material (two "battalion panniers"). It has no fixed scale of transport material, and has no form of ambulance waggon or other wheeled conveyances for the carriage of sick and wounded. One of its chief duties is to collect or improvise material out of local resources such as would be suitable for their conveyance. It has also to organise a bearer *personnel* out of local resources. During the campaign in Manchuria the work of the department in this respect was easy on account of the large Chinese village population, amongst whom excellent stretcher-bearers were found, and also on account of the great resources of the country, in the way of country carts and draft animals, the chief occupation of the population, during the winter at least, being that of carriers. In an army of three divisions the Inspector-General of the Line of Communication and his Principal Medical Officer would have at their disposal three sick and wounded transport department units, and these would be distributed over certain areas connecting the field hospitals with the head of the line of communication, and the head of the line of communication with the railway trains. The work of evacuation of sick and wounded from the field army is carried on by these units, both during an action and during periods of inactivity. In the former case, the advanced sphere of work of the unit reaches right up to the field hospitals, and in the latter case, the unit would push up its advanced position to a convenient spot for the collection of the sick from the various cantonment hospitals of the army. Throughout the sphere of its work it is the duty of the unit to form rest stations, where the sick and wounded can be collected for the purpose of evacuation further down the line, or where they can be received for temporary treatment and refreshment along the route. In the formation of these rest stations it may be helped by the Reserve Medical Personnel.

(5) *Medical and Surgical Reserve Depôts.*

The medical and surgical stores of combatant and other units of the field army, of the bearer battalions and of the field hospitals, are replenished through special mobile field units, which are called Medical and Surgical Reserve Depôts (*Eisei-zai-ryo-yobi-sho*). Each division mobilises one of these depôts. It is a unit with a large establishment for transport, and, like the reserve medical *personnel*, is placed under the line of communication command, and pushed up into the rear of active field operations as required. The unit is under the command of a captain or subaltern officer of the train battalion, and its transport material, like that of all the mobile medical units, is inalienable. It will be seen that an army, consisting of three divisions, has three medical and surgical reserve depôts, which the line of communication command can distribute where it pleases. Each medical and surgical reserve depôt is divisible into three identical sections, and the equipment of each section consists of six panniers, which are identical with the field hospital set, and fifteen others containing material required for replenishing the mobile units. In addition, an indefinite quantity of material may be brought up as required in ordinary packing cases. The set of six panniers, which are identical with those of field hospitals, must be kept untouched; they are intended for the re-equipping a field hospital in the event of a field hospital being captured by the enemy or its equipment lost. From the other panniers and from the stores obtained in packing cases the requisitions of field hospitals and bearer battalions are met. According to the regulations, the panniers of the regimental units are replenished by requisitioning on the bearer battalion or on the field hospitals, but they may also be replenished direct from the medical and surgical reserve depôts. Medical officers have no concern whatever in, and are not attached to any, of the medical and surgical reserve depôt units. The medical service in them is represented by one apothecary, two non-commissioned officers of the medical service trained as compounders, and two instrument repairers. The transport consists of fifty one-horse general service waggons, with corresponding *personnel* and draft animals. Thirty bales of bedding and hospital clothing are carried in addition to the panniers. Country carts may be requisitioned for carrying extra stores in packing cases.

(6) *Line of Communication Hospitals.*

Line of Communication Hospitals (*Hei-tan-Byo-in*) are formed at any suitable place, and their situation conforms with the extension

of the line. The customary localities are the sea base, the head of the line, and important stations or junctions along the line. In the case of an army that is advancing, the line would extend into the area in which stationary field hospitals have been established. These would then be converted into line of communication hospitals, so that the transition from the stationary field hospitals to the line of communication hospitals is a matter of time only and not necessarily one of *personnel* and equipment, as the Reserve Medical Personnel would probably, in the first instance, carry on the work of the latter.

Line of Communication Hospitals, however, are not definitely organised units, that is to say, they have no definite schedule of *personnel* or equipment, but are supplied with such from Japan, from local resources, or from the *personnel* of the Red Cross Society, according to requirement. Their function is mainly to receive and treat the sick and wounded from the troops, garrisoning the locality where they are established, but they are also kept busily employed, specially before and after engagements, in treating the sick and wounded that are being evacuated down the line. They can scarcely be called the equivalent of our General Hospitals in the field, but are more of the nature of our stationary hospitals. At the same time, some of the more important hospitals in Manchuria, such as those at Dalny, Ta-shih-chiao, Liaoyang, Mukden and Tieh-ling, gradually developed into hospitals of considerable size and importance.

(7) *Hospital Trains.*

The Japanese Field Medical Regulations provide for the transport of sick and wounded by hospital trains (*Byo-in Ressha*), or by ordinary trains (*Kanja Ressha, i.e.*, trains carrying patients), the former being defined as trains specially constructed for the conveyance of patients, and the latter as trains temporarily requisitioned and temporarily prepared and equipped. Hospital trains, specially constructed as such, are used for patients suffering from serious wounds or from sickness requiring lying-down accommodation, or for the carriage of cases of infectious disease. They will carry their own supplies, which will be replenished by the station staff along the line of communication or by supply depôts. They are required to have a red cross, one foot in length, painted on a white ground, on the centre of the sides of each car. The cars will consist of ward cars, a car for the staff and dispensary, a kitchen car, and a car for medical and surgical stores. The number of the cars for

wards will be fixed by the Principal Medical Officer of the Field Forces in consultation with the officer in charge of railway transport, according to the state of the rolling stock. A car for infectious diseases and a mortuary car will also form part of the train, but they will be kept isolated from the cars used as ward cars. No fixed establishment is published for the hospital trains, but the scale is two or three medical officers and ten to twenty sick attendants for every hundred patients. They come under the direct jurisdiction of the Principal Medical Officer of the Field Forces, and their journeys will be arranged by him. Male sections of the Red Cross Society may be employed on trains, but the senior medical officer must belong to the regular medical service. Ordinary trains for the transport of sick and wounded are provided, on the requisition of the officer commanding the sick and wounded transport department unit, by the nearest headquarter command on the line of railway. These trains will consist of ordinary railway trucks or cars, and will be arranged to run at least once a day. The number and nature of the cars will depend upon the number of patients and cars available. Such trains are intended for light cases of wounds and sickness only, such, for example, as are able to sit up. Cases of infectious or mental disease will not, as a rule, be carried on them. In Manchuria, during the recent war, all the railway trains employed were of the nature of ordinary trains. No specially constructed hospital trains were used in the Field.

(8) *Hospital Ships.*

The Japanese provide for the conveyance of sick and wounded by sea by means of specially constructed and equipped hospital ships (*Byo-in Sen*), and also by using the ships employed for the transport of troops (*Kanja-Yuso-Senpaku, i.e.*, a transport carrying patients). The chartering of ships for use as hospital ships is done by the Director-General of Communications in Tokio, on application being made by the Principal Medical Officer of the Field Forces. Each ship is assigned to one or other of the ports of embarkation and disembarkation, but the arrangements for the services will be under the authority of the Principal Medical Officer of the Field Forces, on whose recommendations the ships will be fitted up and their sailings arranged. When ordinary transports for troops are used a medical staff and special equipment are put on board.

Hospital ships are distinguished by having the hull painted white, by a green band, one and a half metre wide, painted along the beading, by a red cross on the funnel, and by flying the national

flag and Geneva Convention flag from the mastheads. Ship's boats and launches are painted in the same manner. It is laid down in the regulations that the arrangement for the ship between decks shall be such as to provide accommodation for office, ordinary wards, infectious disease wards, mental disease wards, operation-room, mortuary, disinfecting-room, dispensary, medical and surgical stores, &c. It is further laid down that ordinary wards shall be divided into medical and surgical wards, and again into serious and light case wards. The command of a hospital ship is held by a medical officer of the regular service. In connection with the service of hospital ships, both at the ports of embarkation and disembarkation, refreshment-rooms, with sleeping accommodation and with arrangements for providing meals, will be established. They are under the authority of the Inspector-General of the Line of Communication and will be prepared by his staff. Medical officers attached to these refreshment-rooms and rest stations will be obtained from the establishment on the line of communication.

During the recent war the Army Medical Service employed from seventeen to twenty hospital ships, of 2,000 to 3,000 tons each, carrying 200 to 250 patients each. Six of the larger transports (6,000 tons) were also employed for conveying sick and wounded on the return journey to Japan. They carried between 1,000 and 2,000 patients each and had a large medical staff on board.

(9) *Military Quarantine Stations.*

Military quarantine stations are formed, in connection with the ports of disembarkation, for troops and stores returning from the field. Thus, at present there are military quarantine stations off Moji, Ujina and Kobe, and all the troops and stores arriving there must pass through the disinfecting establishments of these stations previous to landing in Japan.

A military quarantine station consists usually of a set of huts for the accommodation of troops in quarantine, a quarantine hospital, and a disinfecting establishment. The last is elaborately organised, in the miuutest detail, for cleansing the men by means of hot water body baths, and for disinfecting clothing, equipment, valuables, accoutrements, and so on, by steam or formalin.

The largest military quarantine station is the station off Ujina, the port of Hiroshima. It has two sections, with quarantine accommodation for 6,000 troops in each, disinfecting establishments capable of dealing with 8,000 men and their kits daily, and a

quarantine hospital for 1,000 patients. The latter has isolated plague and convalescent wards, in addition to acute case wards.

The diseases for which quarantine is imposed are plague (ten days), cholera and yellow fever (five days).

The station possesses a large staff of medical officers and men for inspecting transports as they arrive, and for disinfecting them if necessary. Transports with scarlet fever, diphtheria, typhus fever and measles are also disinfected by the disinfecting staff from the quarantine station and the cases placed in the quarantine hospital, but the healthy troops are not placed in quarantine on account of these diseases.

As a rule, cases of dysentery and enteric fever, although regarded as infectious diseases and isolated, are taken to the infectious diseases section of the reserve hospitals and not to the quarantine hospital, and the transports containing such cases are disinfected by the port authorities.

A military quarantine station is under the command of a retired officer, usually of the *gendarmerie*. The disinfecting establishment is under a senior medical officer, and the quarantine hospital under another senior medical officer. The establishments consist of recruits or other reserves for general work and work in the disinfecting establishments, and of army medical service reserves or civil sick attendants in the quarantine hospital.

(10) *Reserve Hospitals.*

All the sick and wounded that are sent to the home territory from the field army, as well as the sick of local troops belonging to the depôt divisions, are admitted into and treated in hospitals which are called Reserve Hospitals (*Yobi-Byo-in*). These reserve hospitals are simply the peace garrison hospitals at the headquarters of each division, but such hospitals have been constructed as a rule for about 400 to 600 beds only, and in time of war they have to undergo great expansion. During the recent war many of these garrison hospitals were expanded to accommodate from 10,000 to 15,000 patients. Sites were taken up in various places in the vicinity and hospital huts erected there, each new site forming a section of the reserve hospital. Thus in Hiroshima there were as many as seven sections in addition to the headquarter section, on sites varying from a few hundred yards to two or three miles apart. The same condition of affairs existed at Tokio, Osaka, and elsewhere. A reserve hospital, including all its sections, is under the command of a medical officer who ranks as lieutenant-colonel,

and the staff varies according to the number of patients. As a rule the proportion is one medical officer for every fifty beds.

The reserve hospitals are fully equipped for practically every form of medical or surgical treatment. They have large and elaborately constructed operation rooms, bandaging rooms, kitchens, baths, photographic rooms, Röntgen ray equipment, electric apparatus, laboratories for chemical and bacteriological analysis, and apothecaries' department for the preparation of various drugs from the crude material. The sick and wounded on their return to Japan are sent to the reserve hospital of the division to which they belong. Thus, during the recent war, the sick and wounded from the two territorial divisions that occupied Kyu-shu, the south-western island of Japan, were landed on the island at Moji, the first port of call for ships leaving Dalny or other bases in Manchuria. By far the greatest number were landed at Ujina, the port of Hiroshima, which at one time was a kind of central receiving hospital for many divisions as well as the reserve hospital for its own division. Sick and wounded of other divisions were transferred by rail to their own reserve hospitals when they were able to travel. A third port of disembarkation was at Osaka where sick and wounded were landed for the reserve hospital there, as well as for distribution to the reserve hospitals of other divisions.

It may be said generally that the work of these reserve hospitals was the equivalent of the work performed in our large hospitals in the field during the South African Campaign. In them the complete treatment of more serious and important cases took place, and from them men rendered unfit for further military service were invalided out of the army. In fact, the regulations provide that patients in stationary field hospitals and line of communication hospitals shall be sent back to the reserve hospitals as quickly as possible, in order to keep the hospitals in the rear of operations empty for cases of wounds or disease from the army in the field, as well as to place the patients where they can be most easily treated and to prevent the crowding of the area of operations with sick and wounded. There are elaborate regulations for the interior economy of these reserve hospitals, and for the disposal of patients on convalescent furlough or as invalids. They are practically those that are in operation in time of peace.

(11) *Fortress Hospitals.*

The Fortress Hospitals (*Yosai-Byoin*) are the ordinary Garrison Hospitals of fortified places. When these are invested, the Fortress

Hospital becomes isolated from control of the Principal Medical Officer of the Division to which it belongs and is thus an independent unit, carrying out for the fortress all the functions of a field hospital, a stationary field hospital, a line of communication hospital and a reserve hospital. Fortress bearer battalions are also organised under similar circumstances, and the *personnel*, when not otherwise engaged, may be employed in hospital duties.

(12) *Infectious Diseases Hospitals.*

Hospitals for the treatment of infectious diseases, which in the Japanese Army include enteric fever and dysentery, are formed on the area where these diseases break out. They are not separate units, organised as infectious diseases hospitals (*Densen Byoin*), but one or more field hospitals or sections of field hospitals may be opened to form an infectious diseases hospital. The object of the organisation of the Japanese Army is to avoid moving infectious diseases down the Lines of Communication or to Japan, but to isolate them on the spot where the disease has been contracted. The infectious diseases hospitals therefore form practically sections of cantonment hospitals as noted above, or of line of communication and stationary field hospitals. They are not provided with any special apparatus for disinfection, but infective material is burned or treated with chemicals.

Evacuation of Sick and Wounded.

The organisation of the Japanese Army for the evacuation of sick and wounded is especially complete, and is carried out by the units organised for that purpose. These units are from front to base: (1) The regimental or assistant stretcher-bearers; (2) the companies of the divisional bearer-battalions; (3) the sick and wounded transport department units; (4) ordinary and hospital trains; (5) hospital ships. The details of all these have already been noted. Rest and refreshment stations are provided along the whole line of evacuation.

Medical and Surgical Supplies.

The medical and surgical material is provided as follows:—

In Tokio, affiliated to the War Office, there is a large Central Depôt for the supply of medical and surgical material and also for the manufacture of a considerable variety of tabloids, pills and solutions for hypodermic injections. This depôt is under the charge of a senior apothecary. There is no medical officer attached

to it. In it all the material for the field army is packed for conveyance to the area of occupation. Material not prepared in the depôt itself is obtained from private firms, or, in fact, wherever it can be got at the most economical rates. At the headquarters of each division in the home territory there is also a depôt for the supply of medical and surgical material, from which, in time of peace, the hospitals of the territorial district draw their supplies. These depôts may be called upon to feed the central depôt in Tokio by purchases in their districts. Thus Osaka, the great industrial and manufacturing centre in Japan, supplied large quantities of material to the local medical and surgical supply depôt and through it to the central depôt in Tokio. The material forwarded from the central depôt to the field is packed in wooden cases, all being of a size easily handled by a single individual. These cases have a red cross painted upon them. They are forwarded to depôts at ports of embarkation and they are shipped from there to similar depôts at ports of disembarkation, but there is no large base depôt for the supply of medical and surgical material in the area of operations. The equivalent of such a depôt consists of a section of the general supply depôt in the field, which is under the charge of the intendance and which supplies clothing and other material to the army generally. One of its departments deals with hospital supplies, and from it the line of communication hospitals and the medical and surgical reserve depôts have their requisitions complied with. These supply depôts are formed at sea bases, or in the large centres up country. Their position, in fact, conforms with the general advance of the armies which they supply.

Sanitary Duties of the Medical Service.

The sanitary duties of the Japanese medical service are very similar to those of the British medical service. There is no sanitary equipment with units with the exception of supplies of quicklime and alum, the former for disinfecting soil and the latter for clarifying water. These supplies are provided by the Army Medical Service. During the latter part of the campaign, however, portable sterilising filters and water boilers, fixed on the one-horse general service waggon, were being issued to the battalion units.

The medical officers of regimental units are advisers on sanitary matters. The sanitation of the unit is usually attended to by a battalion committee of which the senior medical officer is president. The other members are officers or non-commissioned officers from each of the companies.

The units do not carry with them means for analysing water or for other scientific hygienic investigations. Any investigations of the kind are usually of a rough and ready character; but strict enquiries are made as to the presence or otherwise of infectious disease amongst the natives of the locality through which troops pass or in which they are cantoned. The field hospitals carry water analysis cases, but do not, as a rule, carry microscopes, yet some divisions seem to have provided their field hospitals with equipment of this kind, including an equipment for bacteriological investigations. On the lines of communication very complete laboratories are established both for chemical and bacteriological analysis, usually at the headquarters of the line and attached to the Principal Medical Officer's office.[1] Hospitals on the line of communication have chemical analysis cases, bacteriological cases and microscopes.

There are no special sanitary officers in the field, but the Principal Medical Officer of divisions makes use of one or other of his assistants for sanitary work, or may select one or more of the medical officers belonging to field hospitals, who are specially fitted for sanitary work, to carry on investigations of a sanitary nature. In the event of epidemics occurring special sanitary committees are formed who are responsible for dealing with the epidemic, and special experts may be sent into the field to investigate scientifically the origin and nature of the epidemic.

Recruiting, Training of Personnel and Ranks of the Medical Services.

The commissioned officers of the Japanese Army Medical Service consist of medical officers and apothecaries. The ranks of the medical officers are :—

Director-General (Lieutenant-General), *Gun-i-cho-kan;* Surgeon-General (Major-General), *Gun-i-kan;* 1st Class Senior Surgeon (Colonel), *Itto Gun-i-sei;* 2nd Class Senior Surgeon (Lieutenant-Colonel), *Nito Gun-i-sei;* 3rd Class Senior Surgeon (Major), *Santo Gun-i-sei;* 1st Class Surgeon (Captain), *Itto Gun-i;* 2nd Class Surgeon (Lieutenant), *Nito Gun-i;* 3rd Class Surgeon (2nd Lieutenant), *Santo Gun-i.*[2]

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[1] A set of four cases or boxes of field laboratory equipment has recently been added to the field medical material for the formation of these Laboratories.

[2] Promotion is partly by seniority and partly by selection: 3rd Class become 2nd Class Surgeons after three years, but graduates of Universities are commissioned direct as 2nd Class Surgeons; 2nd Class become 1st Class Surgeons after

They are selected from men who have passed the State examination qualifying them to practice medicine and surgery in Japan. The medical education, it may be mentioned, consists of University education (that is to say in Tokio, Kioto and Fukuoka), education at the medical schools throughout the country, of which there are about fifteen, and education by private study. The University graduates are considered the most highly educated, and indeed have a medical training that is equal to any that could be obtained in the best schools in Europe. First appointments are made by competitive examination amongst qualified medical men.

On appointment to the medical service the young medical officers do not go to the Army Medical School at once, but are transferred to do duty with an infantry battalion or other unit for three or more years, after which time they are brought to the Army Medical School for the purpose of going through a course of training in military medicine, surgery, hygiene and pathology. During the year there are two such courses, each of four months. Fifty officers attend each course. Various opportunities are subsequently given to specially able students of the School to carry on original investigations or work in the laboratories of the School or in the Universities of Japan or Europe. At the outbreak of the war with Russia the number of medical officers of the regular service was 1,076.

A reserve of medical officers is formed out of several elements.

(1) There are medical officers of the regular service on the retired list, who are not too old or unfit for service. These may become Principal Medical Officers of depôt divisions or of lines of communication. Some of them, too, are eminent in civil life and may be employed as consulting surgeons of military hospitals. One, Surgeon-General Kikuchi, went into the field, during the recent campaign, as the Principal Medical Officer of the First Army.

(2) Medical Officers of the regular reserve. These are medical men who, when they were medical students, drew numbers for compulsory service with the colours, and who served for one year only on condition of their entering into the reserve as medical officers when they obtained their qualification. At the time war

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three years; 1st Class Surgeons 3rd Class Senior Surgeons after five years; 3rd Class Senior Surgeons 2nd Class Senior Surgeons after four years, and 2nd Class Senior Surgeons 1st Class Senior Surgeons after three years in their respective ranks.

was declared they numbered 2,317. They are liable to be called out from time to time for duty during manœuvres or in the military hospitals throughout the whole of their period of service in the reserve. They wear the same uniform as the medical officers of the regular service, but are only promoted from one rank to a higher rank during actual service.

(3) Another reserve of medical officers is maintained by the Japanese Red Cross Society, as will be noted later on. The number of this reserve, at the time war was declared, was about 300.

(4) After war was declared, many of the young civil practitioners, who were not on the reserve, volunteered for service, and a large number of them was accepted, but only on condition that they enlisted in the Reserve of Medical Officers. By so doing they were brought under military discipline, wore the uniform of a medical officer of the army, and received rank as such. They were in no way distinguishable from other officers of the medical service.

(5) Several practitioners, who were anxious to serve in the army, but who did not wish to volunteer to enter the reserve, were allowed to do duty in plain clothes in the wards of military hospitals in the home territory only.

As a rule, medical officers of the regular reserve were appointed to regimental units, bearer battalions, and field hospitals. Those who volunteered to enter the reserve were appointed to line of communication hospitals. The Red Cross Society's medical officers did duty in hospital ships or in military hospitals of the home territory, or garrison of occupation in Manchuria.

Apothecaries (*Yaku-zai-kwan*) hold commissioned rank, and are recruited and form reserves in the same way as the medical officers. Many of them are highly educated scientific chemists, and are a valuable element in the medical service, relieving the medical officers of such duties as care of medical and surgical equipment, returns and requisitions connected with such material, chemical analysis, and so on. At the commencement of the recent war, the apothecaries of the regular service numbered 96, and of the reserve 404.

The uniform of medical officers and apothecaries is similar to that of combatant officers, except that the band of the cap and the stripe on the trousers are dark green as a distinguishing colour. A new uniform, however, was adopted towards the end of the campaign for all branches of the service. It is of a drab serge, somewhat similar to the service uniform of the British Army. The

band of the cap is red for all branches of the service, there are no stripes on the trousers, and the medical officer is distinguished from other officers by a green gorget on the collar, and by having silver instead of gilt buttons.

The rank and file of the medical service are not recruited direct from the civil population. They are selected from men who are serving with the colours, and who are in their second year of service and have a good character. The men are so selected in the proportion of one or two per company. They are trained first of all by the medical officers of the battalion, and secondly, by a course of training in the military hospital at the headquarters of the division to which their unit belongs. When their training is complete, they are appointed to act as the medical non-commissioned officers of their companies. During each year a number of men are passed through a course of training for the medical service in this way, usually in two batches of forty men each in each division. They pass into the reserve eventually, as reserves of the army medical service. A certain number of them are transferred to the military hospitals, where they do duty in time of peace as ward-masters, and as a clerical staff. When divisions mobilise for war, the medical establishments of the dressing station section of the bearer battalions, of the field hospitals, and so on, are formed out of these reserves as well as out of those doing duty in military hospitals at the time. In time of peace none of these men do duty as nursing orderlies or hospital attendants in the military hospitals. Such duties are performed by a class of men who are not of sufficient height, age, or physique, for military service, but who are trained as sick nurses. They are not enlisted soldiers, but are simply civil employés of the army. In time of war they form a large proportion of the ward orderlies and sick attendants in the line of communication hospitals, being drafted thither from the hospitals in the home territory. Their places in the latter, as noted below, are taken by the nursing sections of the Red Cross Society.

The uniform of enlisted non-commissioned officers and men of the medical service, has the same green facings as that of the officers, with the addition of green shoulder straps, on each of which the Æsculapian rod and serpent, in a laurel wreath, are embroidered. The civil sick attendants and ward orderlies wear a uniform of black cloth without any facings. They have a black band round their cap and a circular metal badge with an ideograph on it, signifying that they belong to the land forces. Enlisted men

invariably have a metal star instead of this ideograph badge, on their caps. Both the officers and men of the Red Cross Society's nursing sections have a special uniform of their own supplied to them by the Red Cross Society.[1]

Voluntary Aid.

The Red Cross Society of Japan controls all voluntary aid in time of war. The Society is directly under the control of the Army Medical Service, as regards the nature of the aid that will be given during war, and is organised according to directions given to it by the Director-General of the Army Medical Service. The membership is very large, and consists of a considerable percentage of the total civil population (1 in 45), whose activity consists, as a rule, merely in paying monthly or annual subscriptions. Each member is authorised by imperial decree to wear the membership medal as a decoration, and many soldiers in the field will be seen with it on the left breast.

The manner in which the Red Cross Society prepares for helping the medical services of the army is as follows :—

(1) It maintains some three or four hospitals situated in different parts of the country, the largest and most important of them being in Tokio. These hospitals are handed over to the Army Medical Department in time of war and come under their control.

(2) It trains a large staff of women in nursing duties in these hospitals. The training is very complete and extends over a period of three years before the pupil is considered qualified. After passing through this training the nursing sister is obliged to serve as a Red Cross Society's nursing sister in time of war. At other times she may undertake any private nursing she likes.

(3) It trains and enlists in its membership a body of male sick attendants, who also must be prepared to work in time of war under the Red Cross Society.

(4) It keeps a register of medical officers, none of whom may

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[1] The various ranks below that of Commissioned Officers in the Medical Service are as follows: Surgeon-on-probation (*Gun-i-ko-ho-sei*), 1st class Hospital-Sergeant (*Itto Kango-cho*), 2nd and 3rd class Hospital Sergeant (*Nito* and *Santo Kango-cho*), Hospital Corporal (*Kango-shu*), Compounder (*Yaku-zai-shu*), Hospital orderly (*Kango-sotsu*), Instrument repairer (*Mako*), Civil male nurse (*Kango-nin*), Female nurse (*Kango-fu*), Stretcher-bearer (*Tanka-Sotsu*), Assistant Stretcher-bearer (*Hojo-Tanka-Sotsu*).

be medical men who are on the active list of the army, in the army medical reserve, or liable to serve in time of war. In other words, the medical officers of the Red Cross Society are men who are beyond the age of liability for military service or who are precluded on account of some defect from such service.

(5) It maintains in readiness for mobilisation nursing or relief sections (*Kyu-go-in*), of which a proportion are composed of female nurses and a proportion of male nurses. At the commencement of the war the *Kyu-go-in*, Nos. 1 to 98, were female nursing sections, and Nos. 99 to 116 male nursing sections. The composition of each of these sections is identical, namely:—

Two medical officers; one apothecary; one administrative officer for pay and supply duties; two senior nursing sisters (or senior male nurses); twenty female nurses (or male nurses).

The sections are organised in this manner by the direction of the Army Medical Service, and are considered to be the *personnel* required for taking over the treatment of and attendance on 100 patients. Each section is divisible into two sub-sections, each sub-section being sufficient for the care and treatment of fifty patients. In time of war the male nursing sections are usually employed in the lighter case wards of the military hospitals in the home territory, replacing the regular staff of civil male nurses who may be sent to the lines of communication, or they may themselves be sent up to hospitals or rest stations on the lines of communication. The female nursing sections replace the civil male nurses in the military hospitals for duties in connection with the more serious case wards and operation rooms, and they are also employed on hospital ships. No female nursing sections have been employed in Manchuria or anywhere outside Japan, except on these ships.

(6) It maintains two hospital ships, the "Hakuai Maru" and the "Kosai Maru," which in times of peace are used as passenger steamers by the Nippon Yusen Kaisha. These ships do not come under the Hague Conference application of the Geneva Convention in the same way as those prepared by the military authorities, and to mark this distinction they have a red instead of a green band painted along the beading. In other respects they are similar.

(7) It controls the work of an affiliated Society called the Ladies' Volunteer Nursing Association. This Association is an association of ladies who arrange to meet trains of invalids returning from the front, to give them refreshments, to help in attending on them and in the dressing of wounds, and to do any work that they may be

called upon to do in the wards of the hospitals in the home territories. They also undertake to prepare any number of first field dressings and bandages, which they may be called upon to supply by the Director-General of the Army Medical Service. During the recent war a considerable quantity of such supplies was contributed and prepared by this association.

(8) It organises and trains sick and wounded transport sections. They are composed mainly of men who have finished their period of reserve service and who have been military stretcher-bearers. They are especially expert in making improvised stretchers and litters. At the time war was declared, only three of these sections had been organised.

STATISTICAL AND OTHER RETURNS IN THE FIELD.

The Principal Medical Officer of the Field Forces, Principal Medical Officers of Armies, Lines of Communications, Divisions and Fortresses, the officers commanding hospital units, with the exception of the Reserve Hospital, the Officers Commanding Bearer Battalions, Reserve Medical Personnel units, Medical and Surgical Reserve Depôts, Sick and Wounded Transport Department units, Hospital trains and Hospital ships, are obliged to keep *field diaries*. The Principal Medical Officer of a Depôt Division and of a Reserve Hospital keep, instead, what is called a *Depôt diary*.

A *daily return of killed* is submitted by medical officers of battalions and other fighting units. These returns are compiled from books kept by the battalion medical officers and medical non-commissioned officers of companies. These books are small pocket foils of fifty forms each. When a medical officer or non-commissioned officer of the medical service comes across any man who is killed, he enters in one of the foils the particulars as to name, &c., and also the nature of the wound, and at the end of the day hands in all the foils containing these entries to the senior medical officer of his unit, who compiles a return from them, which he sends to the officer commanding his unit. In this way fairly accurate returns are obtained, showing the cause of death in the case of men who are killed outright, as well as a nominal roll of the casualties.

Three times a month, namely, on the 10th, 20th and last day of the month, a *statistical return of the sick and wounded* of each unit is prepared by the medical officer. These are simple numerical returns, merely noting the number of officers, non-commissioned

officers and men who have been treated, who have died, or who have been sent back to duty, for injuries in action, injuries otherwise, infectious diseases and other diseases. Similar returns are submitted from all hospital units showing the numbers admitted and discharged, with a note as to the number of vacant beds in the column for remarks.

A *monthly return* is submitted from all units and hospitals showing the admissions according to diseases, in much the same form as our monthly return. Fresh admissions are distinguished in the columns from those who are admitted as transfers from other hospitals, and in like manner those who are discharged as recovered are distinguished from those who are discharged as transfers to other hospitals, or as invalids or convalescents. These returns are sent to the Principal Medical Officers of divisions, who compile from them a consolidated monthly return for their division and forward it through the Principal Medical Officer of their army to the Principal Medical Officer of the Field Forces. The Principal Medical Officer of an army does not compile a consolidated return for his army from these divisional returns, but submits them as they stand, after scrutiny.

The reports that have to be submitted by bearer battalions and field hospitals after each engagement, have already been noted. The medical officers in charge of regimental units, and also of the reserve medical *personnel* units, have to submit similar reports.

A *return of surgical operations* is also submitted after each battle by the senior medical officer of field hospitals and of the reserve medical *personnel* units.

The senior medical officer of a sick and wounded transport department unit prepares a *monthly return showing the number of the sick and wounded who have been evacuated* by the unit, and the nature of the diseases, along with remarks relative to the subject.

The field hospitals, reserve medical *personnel* units, and medical and surgical reserve depôts, submit a *return, monthly, of the receipts, issues and expenditure of surgical and medical material.* These returns are prepared by the apothecary of the unit, and are submitted, not to the Principal Medical Officer of the Field Forces, but to the Director-General of the Army Medical Service at the War Office, through the usual channels. The apothecary of a medical and surgical reserve depôt also submits a *monthly return of receipts and issues of surgical instruments and hospital clothing,* which also goes to the Director-General of the Army Medical Service at the War Office.

The senior medical officers of hospital ships, hired transports, hospital trains, or ordinary trains, carrying sick and wounded, submit *returns of the sick and wounded conveyed* at the end of each voyage or journey. These returns are sent to the Principal Medical Officer of the Field Forces.

The officer commanding Bearer Battalions, Field Hospitals, Reserve Medical Personnel Units, Medical and Surgical Reserve Depôts and Sick and Wounded Transport Department units, submit, on the 10th, 20th, and last days of each month, a *return of the personnel and transport animals* of their units, showing the distribution of the various ranks, the nature of the transport animals, whether saddle, pack or draft animals, the numbers received during the period, the casualties, either by deaths in action or from disease, or by transfers or by admissions to hospital, as well as particulars showing the effective strength and excess or deficiency in any of the various ranks or transport animals. In the case of the bearer battalions and the field hospitals these reports go to the officer commanding the train battalion of the division, and in the case of the others to the Inspector-General of the Line of Communication. It may be noted that these are returns of mobile field medical units.

The professional records of sick and wounded accompany the patient, wherever he goes, in the form of "*case sheets.*" During an action every wounded man sent back from his unit must have his wounds examined and recorded in the field hospitals. This is the commencement of the case sheet, and notes of the case are added daily and throughout the whole of the patients' stay in any units of the medical service. These sheets become eventually valuable documents for the preparation of professional medical and surgical histories of the war, as well as evidence in estimating the amount and nature of gratuity and pension that is to be given for injuries. There is also a form for prescriptions which accompanies and is attached to the case sheets.

Patients are classified as patients of the first, second or third class. The first class represents patients whose diseases or injuries have been caused by duty, the second class those not so caused, but caused by circumstances over which the patient had no control, and the third class those over which he had control. In the battalion units there is also a classification into first, second or third class, according to the severity of the injury or disease; patients of the first class being those who must be admitted into the battalion sick room while the battalion is cantoned, or who

must be carried on waggons or on horseback during a march; the second class those who are excused duty, but who come up daily for treatment in cantonments or have their rifles and valises carried for them on the march; and the third class those who have medicine and duty marked on their sick reports and who are relieved of their valises during a march, although they are not allowed to march out of the ranks. If any man in the last class reports sick three days running he must be transferred to either the first or second class. Admission and discharge books are also kept for various units showing these different classes.

It may be mentioned, in concluding these notes, that the organisation, sketched above, has been based upon the Field Medical Organisation of the German Army. The latter has, however, been simplified and modified by the Japanese to suit their own conceptions, and in the matter of equipment of mobile units they approach more nearly the equipment of the mobile units of the British than that of the German Army. The organisation proved marvellously elastic during the recent war, the *personnel* took every advantage of local resources and showed great skill in improvising equipment. The large mass of casualties was dealt with rapidly and without confusion from beginning to end. This was achieved not only by a logical organisation and sufficiency of *personnel* for all purposes, but also by an intelligent and harmonious co-operation of compulsory and voluntary reserves from civil and Red Cross Society sources, under the direction and absolute control of the regular army medical service.

A diagram is appended showing the relative positions of the various units and the spheres in which they work.

HYGIENE AND PREVENTIVE MEDICINE DURING 1905.

By Lieutenant-Colonel R. H. FIRTH.
Royal Army Medical Corps.

In attempting to review the chief features of the past year under this subject, it must be admitted that the period has not been remarkable for any startling advances or discoveries. As in previous years, it will be convenient to consider the chief points under the two main heads of (I.) Sanitary legislation and (II.) Matters of scientific interest.

I. Sanitary Legislation.

Few years have been more barren of sanitary legislative effort than 1905. Out of the twenty-three public general statutes, which represent the total legislation of the year, only two—the Aliens Act and the Unemployed Workmen's Act—can be said to have any relation to public health. In spite of it having been prominent in the King's Speech in February, 1904, we are still without the much-needed Bill to amend and consolidate the law of public health. There is reason to believe that such a Bill had been prepared by the Local Government Board, but it has not yet been laid before Parliament or published.

The Aliens Act.—This measure, to amend the law with regard to aliens, is based on the recommendations of the Royal Commission on Alien immigration. The Act consists of ten Sections, and, broadly, provides for the regulation of alien immigration into, and for the expulsion of undesirable aliens from, the United Kingdom. Section 1 provides that an immigrant shall not be landed from an immigrant ship except at a port at which there is an immigration officer appointed under this Act, and shall not be landed at any such port in the United Kingdom without the leave of that officer given after an inspection of the immigrants in company with a medical inspector. When leave to land is so withheld, the master, owner, or agent of the ship, or the immigrant, may appeal to the Immigration Board of the port, who have power to give leave to land, if satisfied; such permissions operating as the leave of the immigration officer. For the purposes of this Section an immigrant is to be considered undesirable: (*a*) If he cannot show that he has, or is in a position to obtain, the means of supporting himself and

his dependents; (*b*) if he is a lunatic or an idiot, or owing to any disease or infirmity is likely to become a charge upon the rates, or otherwise a detriment to the public; (*c*) if he has been sentenced in a foreign country for an extraditable crime of a non-political character; (*d*) if an expulsion order under the Act has been made in his case. The lack of means shall not be a bar to the admission to this country of an immigrant who can prove that he is so seeking admission solely to avoid persecution or punishment on religious or political grounds; similarly, leave to land shall not be withheld in the case of an immigrant who shows to the satisfaction of the immigration officer or the Board concerned with the case that, having taken his ticket in the United Kingdom and embarked direct therefrom for some other country immediately after a period of residence in the United Kingdom of not less than six months, he has been refused admission in that country and returned direct therefrom to a port in the United Kingdom; likewise, want of means shall not entail refusal of permission to land in the case of an immigrant who can prove that he was born in the United Kingdom, his father being a British subject. Section 2 provides for the appointment of Immigration Boards for ports. Under Section 3 the Secretary of State has power to make expulsion orders requiring criminal aliens to leave the United Kingdom within a specified time. The expenses entailed by the expulsion of undesirable aliens is provided for in Section 4, and the Section also provides for the masters of immigrant ships being liable in these cases to afford the expelled aliens free passages to the original port of embarkation. The requirements as to statistical returns and the appointment of immigration officers is given in Sections 5 and 6. The next Section contains provisions as to penalties for infringment of the Act, and Section 8 contains definitions of immigrants and other terms. The last two Sections make the Act applicable to the United Kingdom, causing it to come into operation on January 1st, 1906, and repeals the Registration of Aliens Act, 1836—an Act which has been long a dead letter.

In the main, the new Act will be administered by the Home Office, but the Local Government Board, from the public health point of view, is also concerned, and doubtless the officers of the various port sanitary authorities will be the executive agents of the Act. The enforcement of the provisions of this Act cannot but help towards an amelioration of the conditions prevailing in certain parts of London and other great seaports; at least the Act must tend to improve the quality, even if it fail to reduce the quantity, of aliens immigrating to this country.

The Unemployed Workmen Act.—This is an Act to establish organisation with a view to the provision of employment or assistance for unemployed workmen in proper cases. Broadly speaking, the Act provides for the establishment throughout the country, more especially in municipal boroughs and certain districts having a population of 50,000 or upwards, by order of the Local Government Board, of representative and responsible distress committees, whose duty it is to make themselves acquainted with the condition of labour within their areas, and to inquire into and discriminate between the applications made to them from persons unemployed. The action of the various local distress committees is co-ordinated by a central body in London, working under the Local Government Board. It is contemplated that the expenses of this scheme will be met by funds contributed privately and voluntarily, but provision is made for meeting any deficiencies out of local rates. No such contribution by a council shall, however, in any year exceed the amount which would be produced by a rate of one halfpenny in the pound calculated on the whole rateable value of the borough, or such higher rates, not exceeding one penny, as the Local Government Board may approve. The Act is made applicable, with certain necessary modifications, to Scotland and Ireland, and is to continue in force for three years from August 11th, 1905, but no longer, unless extended by Parliament. This Act has been frankly criticised by some as faultily conceived on socialistic lines; this may be true or not, but, regarded as an indirect means of coping with, or, at least, ameliorating, some of the worst sanitary evils which follow invariably in the wake of poverty and distress, whatever its defects, it must be recognised as an enactment conceived in the best interests of preventive medicine.

Among the unsuccessful Bills, or those which failed to pass, were the following, having a definite hygienic interest:—The *Milk Depôts (London) Bill*, proposing to empower Metropolitan borough councils to establish and maintain depôts for the sale of pure and sterilised milk for the use of infants. The *Sale of Butter Bill* was a measure introduced by the Government to restrict the amount of water allowable in butter, and to provide for the inspection of butter manufactories by officers of the Board of Agriculture. The *Sale of Whisky Bill*, which sought to secure the differentiation of whisky distilled in a pot still from spirit distilled in a patent still. The *Infectious Diseases (Ireland) Bill*, which proposed to make the Infectious Diseases (Notification) Act of 1889 apply generally throughout Ireland. Also the *Alkali Works Bill*, which, though

mainly a consolidation Bill, contained an important proviso that the owner of every alkali works shall use the best practicable means for preventing the escape of noxious or offensive gases by the exit flue of any apparatus used in any process, and for preventing the discharge of such gases into the atmosphere, whether directly or by a chimney or other outlet, and for rendering such gases where discharged harmless and inoffensive. All these Bills had to be withdrawn for want of time, but it is to be hoped that all will be re-introduced and passed.

II. Matters of Scientific Interest.

Although no startling discovery can be chronicled in the domain of preventive medicine for the year 1905, still, in several departments of study, notably those of epidemiology and bacteriology, there are matters of interest to record.

Yellow Fever.—A severe epidemic of this disease has recently occurred in New Orleans, and, in the *Report of Working Party No.* 2, *Yellow Fever Institute* (Washington, 1905), Beyer, Francis, Parker and Rosenau conclude that the micro-parasite of this affection is still unknown. They further state that no abnormal elements can be discovered in the blood, that the infective principle can pass through the pores of a Pasteur-Chamberland B filter, and that the incubation period, after bites with infected stegomyiæ, is usually three days, but may be five days occasionally. In any attempts to screen the sick from these mosquitoes, it appears to be essential that wire gauze of not less than twenty meshes to the inch should be employed; if of wider mesh than this the stegomyiæ may pass through. The importance of recognising the serious nature of the mosquito as a factor in the dissemination of yellow fever has been emphasised by the recent epidemic in Panama. Here the earlier cases of the disease were concealed, and it was not until a serious outbreak was in progress that severe measures were taken by appointing a special Governor endowed with autocratic powers. The chief danger lay in the demoralisation of public spirit, as shown by a condition of utter panic on the part of some and the lapse into a state of cynical bravado on the part of others. These latter professed an utter contempt for the mosquito theory of disease dissemination, and refused to obey the preventive rules which had been formulated, exposing themselves to mosquito bites and wilfully destroying the netting placed over the windows of hotels and offices. The result of this attitude on the part of the larger number of inhabitants was the incidence of a very severe epidemic. By

stern disciplinary measures and the adoption of a strict sanitary police, especially in regard to mosquitoes, the Governor changed the condition of affairs, with the result that there was soon a rapid diminution of yellow fever incidence, until finally, in three months, no further cases occurred.

PLAGUE.—This disease still holds sway in the centres which, for several years, we have been forced to associate with its prevalence. Of these centres India is undoubtedly the chief, and, although the lessened incidence during the latter part of 1905 serves to keep the total death-rate from the disease lower than was anticipated, the total deaths from plague in India during the last year approximate to 1,000,000, as against 1,034,787 deaths in 1904. The Bombay presidency remains still the chief focus of the disease, but it prevails practically now from Karachi to Burmah, and from Kashmir to Mysore. Although plague has persisted over this large area for ten years, the disease must be considered still as an epidemic, and possibly we shall have to wait another ten years before we can say definitely which areas may be regarded as future endemic, instead of epidemic, centres of the disease. As to what is the essential factor in endemicity we know as little as we did a year ago. Some still attribute the endemicity to infected grain, but it is more probable that animals are the hosts. It is true that rats and mice are infected with plague to an extent in excess of any other class of animal, but it is doubtful if, with these rodents, as with man, the disease is anything but epidemic in character, while there is much to suggest that in some other animal plague finds a permanent home; but everything points to the spread of this disease being no simple process. The much-discussed question of the carriage of plague by fleas has not yet been settled, but Hankin reports that he found plague bacilli imbedded as clusters in the tissues of the stomach of a flea caught upon a dead rat. From the rat itself plague bacilli were not recoverable. There is much, in our later knowledge, to suggest that the rat plays an indefinite part in the dissemination of plague, as we have records of plague in man without the rats in the neighbourhood being affected, while, again, the disease may prevail in rats without man being attacked. Recently much attention has been given to the difference between the common long-tailed black rat of India (*mus rattus*) and the brown or Norway rat of Europe (*mus decumanus*), as a possible clue to the discrepancy in opinion concerning the part which the rat plays in plague, and it may be that the different habits of these rodents account for the peculiar limitations of plague epidemics;

but, in the light of our present-day knowledge, it is impossible to dogmatise. For an interesting, original and suggestive conception of the etiology and spread of this disease we are indebted to our brother officer, Lieutenant-Colonel Skinner (*Brit. Med. Journ.*, 1905, i., p. 994; ii., pp. 622, 926, 1453), some of whose ideas seem worthy of serious study, even if unconfirmed.

The question of controlling plague by the induction of an acquired immunity is still being tested in India, where inoculation by Haffkine's method points to encouraging results. Taking the returns from several areas, it appears that where the procedure has been systematically carried out, 90·62 per cent. of the population were saved by inoculation; while from Aden the figures indicate an eight-fold degree of immunity among the inoculated, and a degree of protection among the attacked equivalent to rather more than double. A new prophylactic for plague has been put forward by Klein in a preliminary report to the Local Government Board (Paper No. 223), for which he claims advantages, over other prophylactics, of reliability and uniform efficacy of dosage. While working at the vitality of the plague bacillus in the tissues of animals dead of the disease, Klein dried preparations of the infected organs over sulphuric acid, and found that, after the bacilli originally contained in them had been killed by the drying, emulsions of the material, when injected in definite amounts, were capable of killing rats within a few hours, although no plague bacilli could be found in their tissues. When smaller amounts of material were injected the animals, though becoming ill temporarily, not only recovered, but were refractory against plague infection on further inoculation with virulent plague bacilli. The obvious inference from this was that the dried plague organs, though not containing any living bacilli, were imbued with a powerful plague toxin, which was capable, in appropriate dosage, of serving as a prophylactic. Arguing from these results and developing the idea, Klein has made a series of investigations which show that the necrotic nodules found in the buboes, spleen, lungs and liver of guinea-pigs which had died of plague, more particularly mild or sub-acute plague, the result of cutaneous injection, when finely minced with aseptic precautions and dried over sulphuric acid at 47° C., yield a material, which is at once readily prepared, of uniform and reliable efficacy, and superior to all other plague prophylactics. Thus, a guinea pig of 350 grammes in weight will yield from 5 to 7 grammes of dry powder, which is equivalent to some 500 protective doses for an adult rat, and which, arguing from the statistics from Haffkine's work in India, is equivalent to 1,000 human doses.

In preparing the prophylactic for use the desired amount of dried tissue powder is weighed out (say 5 to 7 milligrammes for a human adult), well rubbed down in a desired volume of sterile warm water, and the turbid emulsion thus obtained injected subcutaneously. Such material contains not only the acutely active toxin, but also the dead bodies of all the bacilli pestis originally present in large numbers in the necrotic organs (bubo, spleen, lung and liver), with probably other substances of an undetermined nature and action. This material, tested by cultivation, is found sterile. When it is borne in mind that (1) this dried prophylactic does not require more than twelve days for its preparation; (2) that a large volume can be prepared of uniform strength; (3) that its efficacy is easily standardised on the rat; (4) that it is dry, portable and preservable, and that the protection afforded by its injection lasts many weeks in the rat, its general superiority over other preparations is marked. If these claims of Klein's can be substantiated, there can be no doubt of the far-reaching importance of his work, while the answer to the interesting and important question, whence is derived the especial efficacy of the new prophylactic, which contains not only the dead plague bacilli and associated tissue toxin, but also other tissue constituents, will have an important bearing upon the subject of immunity in general. For the present we are forced to remain sympathetically expectant that Klein's sanguine anticipations in this field may be realised.

Malta Fever.—Under this head progress can be reported, notably as the result of the joint commission which has been investigating the disease in Malta. Whether this fever is as widely spread as some think, is perhaps open to doubt, but the evidence is overwhelming as to the serious extent of its incidence in Malta itself, while in some parts of South Africa and in the Philippines its prevalence is equally assured. The Commission recently at work find that the goats in Malta harbour the specific micrococcus, and that the milk from these animals contains the organism. As the milk supply of the island is derived mainly from goats, and the animals live in close proximity to man, this constitutes an observation of the highest etiological importance. It appears that, as hosts of the specific coccus, the goats do not suffer from illness, but it is only too likely that their milk when consumed is the medium by which it is conveyed to man. It is not quite clear how goats become infected originally, but Zammit, who first observed that the blood of goats fed with cultures of the *Micrococcus melitensis*, soon gave an agglutination reaction with the organism, calls attention to the

practice of driving goats about the streets in herds, and as the udders of many of these animals are abnormally large, often touching the ground, their liability to soiling is obvious. The reality of the danger attaching to goats' milk in endemic centres of this disease has been proved by our brother officer, Major W. H. Horrocks, who, on examining the milk of certain goats, the blood of which reacted, was able to isolate the micrococcus from it. To Horrocks we are indebted for some interesting facts regarding the saprophytic existence of the micrococcus; he finds that it survived for sixty-nine days in dry sterilised manured soil, for eighty days on dried fabrics, for seventy-two days in damp soil, for thirty-seven days in sterile tap water, and for twenty-five days in sterilised sea water. Further experiments by the Commission indicate that the inhalation or ingestion of infected dust gives rise to the disease in animals; that the ingestion of infected food gives rise to Malta fever in healthy monkeys; that the subcutaneous inoculation of the *M. melitensis* caused a typical attack in a monkey; and that the micrococcus when recovered from the urine of patients suffering from the fever, is capable of giving rise to the disease in healthy monkeys. If the experiments of Ross and Levick (*Brit. Med. Journ.*, April 1st, 1905) are confirmed, the question of a transmission of this disease by dust and infected urine becomes doubtful. These observers, it may be noted, inhaled cultures in a moist state as well as dried and finely powdered, and also drank water which had been mixed with the urine of a patient suffering from Malta fever without taking any ill effects.

The specific micrococcus has been recovered from the urine in a large number of cases, but not from the sweat, skin or fæces, though in guinea-pigs experimentally infected the organism is passed in the fæces. The organism was found to be present in the blood, though sparsely, or about one coccus in 4 cc. of blood; this fact militates against the idea that the disease may be conveyed by biting insects. For this connection, experiments made with *Stegomyia fasciata* have so far given unsatisfactory results, but before the final word can be said on this point, further experiments with other varieties of insects seem desirable. The year's work upon this disease has been undoubtedly good, but much remains to be done, notably the adoption of practical hygienic methods to establish the truth of conditions which experimental inquiry has shown to be highly probable.

ORIENTAL SORE AND KALA-AZAR.—The development of flagellated forms from the parasitic bodies associated with the names of

Leishman and Donovan, was referred to in my last review of Preventive Medicine in this Journal (vol. iv., p. 285), since then the observations have been confirmed and inferences as to their possible meaning in both oriental sore and kala-azar critically examined. The most important contribution to the discussion of the connection, if any, between these two diseases and malarial cachexia or splenomegaly, has been from James (*Sci. Mem. Med. Off. Army of India*, Nos. 13 and 19, 1905), who, writing of oriental sore, confirms Wright's view that many of the cells composing the new tissue contain parasites which cannot be distinguished from those obtained from the spleen and other organs in certain cases of splenomegaly and kala-azar. On the other hand, the parasites met with in the Punjab and Upper India are capable apparently of producing only the comparatively mild local disease known as oriental sore, while those in Assam produce only the dangerous general disease known as kala-azar. This suggests at once the question whether the parasites of oriental sore and kala-azar may not be different species, though belonging to the same class. No matter how many of these parasites the tissue of an oriental sore may contain, it is notorious that there results from it no general disease such as kala-azar, and assuming that the parasites in the two affections are identical it is antagonistic to the idea that the path of infection in kala-azar is by way of the skin; further, even if any biting insect were proved to be the infecting agent of oriental sore, it does not follow necessarily that this is the mode by which kala-azar is contracted. It is just possible that some have been too hasty in regarding all cases of enlarged spleen with malarial cachexia met with in the Punjab and Upper India, as being due to the parasite found in the spleen and other organs of some cases of like clinical features common in Calcutta, Madras and Southern India. As to kala-azar, James pleads for it to be regarded as a disease distinct from every other, maintaining that it has no connection with malaria; in support of this contention he points out that its geographical distribution in India is more limited, and its presence and conditions of spread quite different from those of malaria. The presumption is strong that the Leishman-Donovan parasite is both present in, and the cause of, every case of kala-azar, but complete proof is still wanting.

Anti-venom Serum Therapy.—Some excellent work in this difficult field of study has been done by Lamb (*Sci. Mem. Med. Off. Army of India*, No. 16, 1905), in continuation of earlier investigation on the same lines. These researches do not lend themselves readily to analysis, but show conclusively that anti-venomous serum

is highly, if not absolutely, specific, and that, for the successful treating of any snake bite, the homologous serum must be used. The establishment of this fact, and it is in accord with Noguchi's conclusions, will be a disappointment to many, as it must limit seriously the possibility of combating the effects of snake-bites by serum treatment.

THE *Spirochæta Pallida* OF SYPHILIS.—The discovery of the causal agent in syphilis has often been claimed, but the recent work of Schaudinn and Hoffmann suggests that we must now place syphilis among the rapidly increasing group of diseases due to protozoa. It may be regarded as certain that, in the primary and secondary lesions of syphilis, a special organism is constantly present: this is the *Spirochæta pallida*, first identified by Schaudinn and Hoffmann (*Berl. Klin. Wochsch.*, May 29th, 1905). This organism can be detected fairly readily by suitable methods in the primary and secondary manifestations of the human disease, and has been found to be present, moreover, in the syphilis produced in apes by inoculation with virus from chancres. In appearance the *S. pallida* resembles a thin spirally-twisted thread, moving backwards and forwards by rotating in a corkscrew fashion round its longitudinal axis; in addition to this motion its whole structure has been described as undulating to such an extent as to amount at times to a lashing movement. The *S. pallida* is distinguished from other members of the spirochæta group by its minuteness and low refractive index, also by the fact that the coils of its spiral are numerous, deep and closely arranged. Its average length is 10 μ with a thickness of 0·6 μ; the number of its coils or twists varies from 8 to 18, each measuring about 1 μ. In some specimens a trace of what appears to be an undulatory membrane has been noted, and Schaudinn has observed in certain cases the existence of a single flagellum at one end with two at the other extremity. The organism is Gram-negative and peculiarly difficult to stain by ordinary methods; it is extra-cellular, but has been observed to be attached to a pus cell, having one end embedded in the cell body. Among other forms of spirochæta are *S. refringens*, common in all inflammatory conditions of the glans and prepuce such as balanitis, also *S. buccalis* found in Vincent's angina, the *S. obermeieri* of relapsing fever, the *S. anserina* of goose septicæmia, and the spirochæta of so-called fowl spirillosis. All this group of spirochætæ are extremely primitive forms and must not be confused with the vibrios which are true fission fungi. The chief organism from which *S. pallida* has to be distinguished is the larger *S. refringens*,

so common in genital ulcers of all kinds, and which further resembles the spirochætæ already known to occur in noma, phagedena, Vincent's angina, ulcerative stomatitis and hospital gangrene. Bearing in mind that Schaudinn's earlier work had shown that one species of spirochæta (*S. ziemanni*) was merely the asexual stage in the life cycle of the trypanosome of the stone-owl, it is suggestive that the sexual disease of the horse, known as dourine, is due to a trypanosome, and that the infective agent is conveyed by direct contact, even through unbroken mucosa, without the assistance of the usual intermediate invertebrate host. Further, in kala-azar, a disease caused presumably by the Leishman-Donovan bodies, and which are also but a stage in the life cycle of a flagellate, there is some evidence of its communicability by the sexual act.

As there is little doubt that the spirochæta of syphilis is the causal germ of the disease, a knowledge of its easy and rapid demonstration becomes increasingly important. A considerable number of papers have appeared discussing suitable methods; the most important, perhaps, is that by Giemsa (*Deutsche Med. Wochsch.*, June 29th, 1905, p. 1,026) in which he recommends a mixture of azur ii.—eosin, 3 grammes, azur ii. 0·8 gramme, Merck's pure glycerine and methylic alcohol, 250 parts of each. This solution is said to keep well, even in the tropics. The film or preparation is first fixed in absolute alcohol for twenty minutes, then one drop of the staining solution is added to one cc. of distilled water and the diluted stain used for fifteen minutes. The spirochætæ stain better if from one to ten drops of a solution (1 to 1,000) of carbonate of potash be added first to the distilled water with which the stain is diluted. Herxheimer and Hubner (*Deutsche Med. Wochschr.*, June 29th, 1905, p. 1,023) do not like Giemsa's stain, but recommend staining the preparation for twenty hours in a filtered 10 per cent. solution of a mixture of Nil and Capri blues. With this reagent they succeeded in demonstrating the parasites in a section of a syphilitic papule. As an alternative, Reitmann (*Deutsche Med. Wochschr.*, June 22nd, 1905, p. 997) advocates that after fixation in absolute alcohol for ten minutes the preparation be placed for five minutes in a 3 per cent. solution of phosphotungstic acid, then washed in distilled water and 70 per cent. alcohol, then washed again in water. Now stain in hot carbol fuchsin, wash in water, pass rapidly through 70 per cent. alcohol, re-wash, dry and mount. By this method the cell protoplasm is very little coloured, the nuclei are dark and the spirochætæ come out a clear red colour.

In the *Comptes rend. Soc. de biologie*, Paris, June 24th, 1905, p. 1,044, Proca and Vasilescu recommend fixation for thirty minutes in alcohol, then in a mixture of phenol 50, tannin 40, and water 100 parts, to which is added 2·5 parts of basic fuchsin. Leave the film or specimen in this mixture for ten minutes, wash and stain for another five minutes in phenol gentian violet. From the diversity of methods suggested it is evident that the demonstration of the spirochætæ is not difficult, although there may be still differences of opinion as to the best method. Bandi and Gimonelli (*München. Med. Wochsch.*, August 29th, 1905), maintain that the elaborate methods of Giemsa and others are unnecessary, and that good results can be obtained by means of the usual methods for staining tubercle bacilli, namely, by first fixing in alcohol or with heat, and then staining for a few seconds with hot carbol fuchsin. Leishman has obtained good results when using his own reagent in the proportion of 4 parts to 5 parts of water, after re-vitalising the film with blood serum and giving a contact with the stain of twenty-five minutes; while similar success in demonstrating an undulatory membrane in the larger spirochæta of a monkey has resulted by the employment of Löffler's stain with an exposure of fifteen minutes at 50° C.

Whatever may be the final verdict as to the precise etiological significance of the *S. pallida* in syphilis, it is noteworthy that the only strong opponent to Schaudinn's views and theory is Thesing, who (*München. Med. Wochsch.*, July 11, 1905) makes the following criticisms: (1) The spirochæta is a bacterium, not a protozoon, because it has neither nucleus, flagellæ, nor an undulatory membrane. (2) The alleged specific differences between *S. pallida* and *S. refringens* are inadequate. (3) Schaudinn's specimens showed so many other organisms as to suggest extraneous contamination. Whatever may be the value of the second and third points, independent observation of others indicates that the first criticism is based upon a misapprehension of facts.

Experimental Syphilis.—In amplification of their earlier work, Metchnikoff and Roux have published their latest researches on the production of experimental syphilis in anthropoids (*Ann. de l'Instit. Pasteur*, November 25th, 1905, p. 673), stating that the chimpanzee is the animal in which the closest analogy to the human disease can be reproduced. In twenty-two chimpanzees inoculated with syphilitic virus from various sources, not a single case of failure has been noted, on the contrary, the lesions produced in every case being typical. The incubation period averaged thirty days. Eight

out of the twenty-two animals presented secondary lesions; the period of incubation of the secondary lesions, that is to say, the time elapsing from the appearance of the primary lesions to the appearance of papules, varied from nineteen to sixty-one days, with an average of thirty-three days. Of the fourteen animals which did not develop secondary symptoms, some had been inoculated with attenuated virus and some died before the lapse of the requisite incubation period. In the case of one animal, which developed secondary symptoms, the disease assumed a severe type; the hair came off all over the body and the bare skin exhibited a very abundant crop of papules, later, these lesions ulcerated; finally, the animal fell into a condition of extreme cachexia and died. Bacteriological examination of the ulcerated papules revealed an abundance of various micro-organisms, particularly streptococci, and the authors consider it probable that death may have been due to a secondary non-syphilitic infection. In several of the animals paralytic symptoms appeared during the secondary stage, but gradually passed off. In the animals which died, death was due in most cases to broncho-pneumonia; but the autopsies failed to reveal any signs of tertiary syphilis. The efforts of the authors to devise a means of conferring immunity have not, so far, met with any marked success, but, as they are continuing the work, they are not without hope that such may be attained ultimately.

In connection with this research it is interesting to note that out of thirty-one cases of monkeys of various kinds in which syphilis after inoculation had been induced, 23, or 74 per cent., revealed the presence of the *S. pallida* of Schaudinn. Metchnikoff and Roux further state that in all their work upon these cases they have never found *S. refringens*, or any other spirilla save that of syphilis.

RECENT WORK ON PROTEID CHEMISTRY AND METABOLISM.—Although the chemical constitution of the proteid molecule is still a matter of doubt, our increased knowledge of its analytical cleavage products suggests that we may soon see the puzzle solved. For this knowledge we are indebted mainly to Kühne; Kossel and Emil Fischer. The earlier conception of the changes which result from the gastric and tryptic digestion of proteids was the formation first of primary proteoses or albumoses, followed by their further splitting up into secondary proteoses, which in turn broke into the still smaller molecules of peptone, a differentiation being made between the peptone produced in the stomach and that produced during pancreatic digestion. Recent work shows that there are no essential differences between the action of the gastric agent pepsin-hydro-

chloric acid and the pancreatic enzyme trypsin. These proteolytic ferments act by a process of hydrolysis, splitting the proteid molecule into proteoses, then peptones, and finally into simple products, such as the mono-amino acids glycin, alanin, leucin, asparagin and aspartic acid, or the di-amino acids ornithin, arginin and lysin, or aromatic amino acids like tyrosin and tryptophane, or certain nitrogenous derivatives of the benzene ring, like indol, scatol, cytosin and cystin. These substances represent various nuclei which exist preformed in the proteid molecule, and are then linked in more or less complicated groups. During proteolysis some of these groups can be detected and separated, notably the combinations of the amino acids which Fischer has termed polypeptides. The polypeptides are ultimately broken down into the amino acids of which they are composed, and practically occupy a position intermediate between the proteoses and peptones on the one hand and the final product on the other. Further, inasmuch as many of these polypeptides have been made synthetically there is great promise of the final synthesis of the larger proteid molecule.

Passing from these purely chemical considerations we find that simultaneous advances have been made in our knowledge of proteid absorption. Not long ago, leucin, tyrosin and similar substances were regarded as so much waste material passing to the liver for conversion into urea. We now know that the absorptive epithelium of the intestine can regenerate the more complex proteid molecule from the quite simple cleavage products. There is thus an analogy between what happens to proteids and what has long been known to happen to fat and carbohydrate. Fat during digestion is split into its fatty acids and glycerin; during absorption and assimilation it is once more synthetised from these simple molecules. So, too, during the digestion of starch, dextrins first appear as analogues of albumens and peptones; these dextrins are converted into molecules of maltose or analogues of the polypeptides, and finally, the simple glucose molecules are formed from the maltose. Ultimately, on absorption and assimilation the larger molecule of glycogen is built synthetically from the small molecules of sugar. Moreover, animal experiments indicate that it is possible to maintain weight, health and nitrogenous equilibrium for a considerable time by feeding upon the crystalline cleavage products resulting from pancreatic proteolysis; in other words, we are forced to form an entirely new conception of the origin of the most important chemical material of living tissue.

If, then, this theory or assumption of a complete breakdown of

the proteid food in the alimentary canal previous to its being built up into living tissue be true, what will be the fate of food proteids when introduced into the blood stream without the intervention of the alimentary digestive processes? Mendel and Rockwood's work (*Amer. Journal of Phys.*, vol. xii., p. 336, 1905), throws some interesting light on this point. They find that proteids administered by intravenous or intraperitoneal injection are retained and apparently utilised, though rapid injection may cause toxic symptoms. Clinical experience with nutrient enemata indicates the possibility of a direct absorption of proteid without previous digestive changes. Although the usual form in which the body gets its proteid is by building it up from simple crystalline materials, the result of intestinal digestion, still, if these are not available, it can get proteid by absorbing the larger molecules presented to it. This is not inconsistent with the view that preliminary proteid cleavage is a necessity, though the *locus* of that cleavage need not be necessarily the alimentary tract; the fact being that the cells of the other tissues or the enzymes present in those cells are capable of a vicarious action, doing the work of trypsin and the erepsin of the intestinal juice. This view is supported by Vernon's recent discovery that every tissue of the body has an ereptic action. The importance of the tissue enzymes or erepsins in the metabolic cycle during life has long been suspected, and there can be little doubt that they are the means which enable the tissue cells to break down and then assimilate the proteids brought to them by the blood and lymph, as well as to initiate those subsequent katabolic changes which terminate in the excretion of waste materials.

The fundamental laws governing proteid katabolism are closely associated with, if they do not actually dominate, those governing the composition of urine, and the recent work of Otto Folin (*Amer. Journal of Phys.*, xiii., 1905, pp. 45, 66 and 117) prompts the thought that we must reconsider our ideas not only as to the nature of proteid metabolism but as to what is and what is not a normal urine. To appreciate the meaning of the newer ideas, one must be reminded that two main theories have long held the field, they are those of Voit and Pflüger. Voit's theory states that katabolism occurs only in "dead" or "circulating" proteid; while Pflüger enunciates that before katabolism occurs, all the proteid input must be transformed into living material. Folin suggests that neither of these extreme views is correct, but that nitrogenous katabolism is of two kinds—one is

immediate, inconstant, varies with the food, and leads to the formation of urea and the inorganic sulphates; the other is constant, smaller in amount and largely represented by kreatinin, neutral sulphur compounds, some uric acid, aromatic sulphates, and possibly a little urea. This latter form of metabolism may be regarded as tissue or *endogenous* metabolism, whilst the other is *exogenous.* The endogenous metabolism marks the limit of the lowest level of nitrogenous equilibrium, and the proteid input sufficient to maintain it is the indispensable minimum. It is possible that the proteid which is metabolised exogenously is by no means necessary; there is certainly evidence to show that it can be replaced by non-nitrogenous food. In other words, the katabolism which ends in urea formation is of less fundamental importance than that which leads to the elimination of kreatinin; possibly the formation of ammonia and amino-acids as the result of intestinal activity is but a means of getting rid of any excess of nitrogen taken in. Or we may say that the organism requires only the small amount of nitrogen necessary for endogenous metabolism, and that yielded by an excess proteid input is unnecessary.

An interesting corollary to these purely theoretical considerations is afforded by Chittenden's recently published experiments (*Physiological Economy in Nutrition*, 1905, Lond., Heinemann) with reference to the minimal proteid requirements for healthy men. It is well known that physiologists have varied greatly in their estimation as to the true physiological necessities of the body for proteid food. The standard of diet generally accepted for an adult man of average weight (145 lbs.) doing a moderate amount of work is that suggested by Voit, namely, proteids 118 grammes, of which 105 grammes would be absorbable, fats 56 grammes, and carbohydrates 500 grammes, with a total fuel value of 3,000 calories. There is much evidence to show the possibility of a much lower standard of diet sufficing to meet the real physiological needs of the body. Thus, Kumagawa, studying the diet of the Japanese, found with a purely vegetable diet containing per day 54·7 grammes of proteid (equal to 8·75 grammes of nitrogen), 2·5 grammes of fat and 570 grammes of carbohydrate, that health and nitrogenous equilibrium were maintained; the average daily output of nitrogen by the urine being 6 grammes and in the fæces 2 grammes, or, of the total nitrogen—containing food, barely 70 per cent. was absorbed. Chittenden's singularly elaborate and fully detailed experiments, carried out during many months on professional men, on soldiers of the Medical Corps of the United States Army, and on trained

athletes of the universities, confirm these facts, and make it plain that our accepted dietary standards are too high, and prove conclusively that the physiological needs of the body can be met by a greatly reduced proteid intake as represented by some 60 grammes. This, moreover, can be accomplished without increase in the daily intake of non-nitrogenous foods. In Chittenden's experiments the proteid intake was reduced to half, and in some cases to less than half, the number regarded as normal. After a variable initial drop in body weight, the deprivation was apparently followed by no untoward results; equilibrium was maintained, the health remained perfect or improved, the muscular force in the athletes was usually increased, mental activity was undiminished and desire for richer food disappeared. His results obtained with thirteen soldiers living for over five months on a prescribed diet and exposed to the ordinary stress of military service, are of peculiar interest to ourselves. A metabolism of less than 50 grammes of proteid per day, corresponding to 7 to 8 grammes of nitrogen, was quite sufficient for the needs of the body, and a fuel value of some 2,600 calories was ample to meet the requirements of these men. In the face of these carefully conducted observations, it may be asked why adhere to an input of 118 grammes with a metabolism of 105 grammes of proteid per day? The affirmative answer is not easy, especially when we recollect that the 18 grammes or so of nitrogen in the urine, resulting from this higher intake of proteid, reach the final stage of urea, &c., only by passing through a series of stages, each one of which means the using up of energy, to say nothing of that required in digestion, absorption, &c. It needs little imagination to picture the amount of physiological labour which the daily handling by the body of such amount of proteid food entails, or to fancy how the liver and kidneys must rebel at times at the excessive labour they are called upon to perform. An additional justification for moderation in proteid ingestion lies in the fact that many of the nitrogenous katabolites are toxic and that the evil results due to their accumulation are real. In a word, all this newer work is a suggestive plea for a revolution in our ordinary dietary and a reversion to what may be called a simpler mode of living.

To us, as practical soldiers, the whole question is of importance, especially in so far as it bears upon the dietaries of men serving in the tropics or on field service. To many of us the idea is not new that much preventable disease and possibly some of the excessive liability to certain types of fever, particularly among young Europeans in

the tropics, is to be attributed to faulty alimentation, mainly in the direction of excessive consumption of proteid foodstuffs. But before we can accept the newer doctrine in its entirety there is need of further research, notably in the determination of precise facts as to metabolism in the European on translation to a tropical climate. All our hitherto accepted physiological teaching as to nitrogenous balance needs to be put aside and the subject approached *de novo*. We need to know what is a normal urine both at home and in a tropical country. A vast field for research lies open before our officers serving in all parts of the world. Work on the lines which Statham of our Corps has so well sketched out in the pages of this Journal[1] will well repay the labour which it involves. Personally, I am convinced that Chittenden's views are near the truth, and that subsequent research and experience will both confirm and extend his ideas: for the present, however, sympathetic caution should be our attitude, coupled with every endeavour to observe and determine facts bearing on this question; not the least important of these will be evidence showing whether the power of resistance to disease is diminished in any way by a low proteid intake. The problem involved in the answer to the question—what is the minimal proteid requirement for the healthy man?—is one that must attract the attention not only of the physician and the physiologist, but also claim the careful consideration of the economist and sociologist. It is a question which concerns as much the man interested in securing immunity to disease as the individual whose interests are centred chiefly in the prevention of race degeneration.

THE INTER-RELATION OF TYPHOID AND PARATYPHOID INFECTIONS.—It is well known that in certain cases of continued fever, presenting all the clinical symptoms of mild enterica, the Grüber-Widal reaction is absent. The existence of this fact has suggested the recognition of a new disease, called, for want of a better name, paratyphoid; further, the majority of these cases have been found to be associated with the presence in the body of a bacillus culturally distinct from the bacillus of Eberth. Biologically this bacillus occupies a position intermediate between the common colon bacillus of Escherich and the enteric micro-organism of Eberth and Gaffky (JOURNAL ROYAL ARMY MEDICAL CORPS, vol. ii., p. 241). The origin of these paratyphoid infections is as yet imperfectly understood, though it is probable that, like enterica,

[1] JOURNAL ROYAL ARMY MEDICAL CORPS, vol. i., p. 191, also vol. ii., pp. 123 and 320.

they are transmitted by means of fouled food and water. A very suggestive paper bearing on this subject, and one which seems to have attracted much less notice than it deserves, was published last year by our brother officer, Captain A. B. Smallman (JOURNAL ROYAL ARMY MEDICAL CORPS, vol. v., p. 137.) He treated some two hundred guinea-pigs with living and dead enteric bacilli, injecting pure cultures of the micro-organisms into the abdominal cavity; all died at varying periods following the injection. The micro-organisms cultivated from these animals after death were in the majority of cases true and typical enteric bacilli; but in twenty-two cases in which living enteric bacilli had been injected the micro-organisms found were of the intermediate or paratyphoid type. It is an interesting question, whence did they come? They were not found in the fæces of the control animals, but were present in the intestinal contents of the guinea-pigs which had been inoculated with enteric germs; so clear are the facts that it would seem possible that a transformation had been effected within the animal. This conception opens up a wide range of possibilities, so much so that one cannot resist hoping that this clue may be followed up to determine whether the paratyphoid bacillus in the lower animals is the analogue of Eberth's bacillus of enterica in man, and whether the latter may not be regularly transformed into the former in passing through certain animals, notably pigs, dogs, cats, and rats, and so cause this infection in man. Many of the types of so-called swine-fever in pigs are eminently suggestive of this sequence of events, while many rats found in styes and yards frequented by infected swine are not free from similar lesions. Another point which suggests itself is, whether an attack of paratyphoid fever confers immunity against genuine enterica. If it does confer immunity, and if passage through one of the lower animals transforms the enteric bacillus into the less virulent intermediate or paratyphoid, there may here be a suggestion of protective inoculation against the more serious disease.

THE ENTERIC BACILLUS AND PULMONARY INFECTION.—That the specific bacillus enters the general circulation and is not infrequently found in the lungs during an attack of enteric fever is well established, but the precise effect of the presence of these micro-organisms in the lungs is still uncertain. Robinson (*Journ. Inf. Dis.*, vol. ii., p. 498) reports observations which throw some light upon the significance of the enteric bacillus in pulmonary complication of enterica. One case, after being in hospital twenty-seven days with a typical attack of typhoid fever, suddenly develops the signs

of lung infarction, after which he passes into a marked toxæmic condition, and dies a few days later. At the autopsy one lobe of the right lung is converted into an abscess cavity. A broncho-pneumonia is present in the rest of the right and throughout the left lung; a pure culture of the enteric bacillus is obtained from the abscess, and in both lungs bacilli alone are seen in sections stained with methylene blue, but no organisms are seen in sections stained by the Gram-Weigert method. The complete absence of any other causative agent suggests the conclusion that the enteric bacillus is capable of causing pulmonary abscess and gangrene in lung tissue. The existence of broncho-pneumonia in the lungs of those dying of enterica is frequent, and when the various inflammatory lesions produced by the enteric bacillus are considered, it is not unreasonable to suppose that this organism can produce broncho-pneumonia; the evidence, however, in support of the idea is astonishingly small. Chantemesse and Widal, who were the first to investigate the subject, drew the conclusion from certain cases that came under their notice that broncho-pneumonia found in enteric fever was to be considered as a specific manifestation of the disease. Finkler, Bruneau, Lepine and Bancel, have all reported cases of similar nature and expressed the same view. As to the lobar pneumonia complicating enterica, it is probable that the enteric bacillus plays a subordinate rôle. All investigators have found the pneumococcus present in such conditions, and regarded it as a secondary invasion. The *B. typhosus* has been rarely isolated in these cases, though it can undoubtedly exist together with the pneumococcus in the circulating blood of patients suffering from lobar pneumonia as a complication of enteric fever. Although there is no doubt that the pneumococcus is the usual cause of lobar pneumonia in enterica, there is some evidence that such a lesion may be caused by the typhoid bacillus. Curschmann long ago held this view, although admitting this must occur very rarely. Other writers for the most part consider a true typho-pneumonia as unproved or even impossible. Robinson (*op. cit.*) gives details of a case which is very suggestive, but it is noteworthy that the bacillus isolated was of the paratyphoid type B. The experimental work upon this subject is small, and mainly negative; the best being that by Lepine and Lyonnet (*Arch. de Med. Exp.*, 1899, vol. ii., p. 549). The fact that the enteric bacillus may be present in the lungs in the pulmonary complications of typhoid fever, makes it probable that it is not infrequently present also in the sputum of these cases. The most extensive study of this question has been made by Jehle (*Wiener Klin. Wochsch.*, 1902, p.

232), who concludes that the enteric bacillus is present regularly in the sputum and bronchial secretions of enterica, complicated by pneumonia or broncho-pneumonia, and that it exists there only a little less regularly in the sputum and bronchial secretions of cases with simple bronchitis only. This is a fact which should be emphasised, in order that any spread of the disease by this means may be prevented. It would, further, appear that when either *B. typhosus* or *B. paratyphosus* B. are the causative factors of a lobar-pneumonia in enterica, the pneumonia is of a hæmorrhagic character, clinically recognisable from the bloody nature of the sputum.

Recent Work on Pneumonia.—In October, 1904, a Commission was appointed by the health department of the city of New York to investigate the subject of pneumonia. A report of some of the work undertaken for this Commission by skilled laboratory workers has now been published (*Journ. Exp. Med.*, vol. vii., No. 5, August 25th, 1905). The Commission decided to concentrate attention first upon the bacteriological and clinical aspects of lobar-pneumonia. Among the studies bearing on these points which it was decided to pursue were the following: (1) A study of the occurrence and virulence of the pneumococcus and organisms related to it in the human mouth in health and disease; (2) the evidence of variations in virulence of the pneumococcus; (3) the occurrence of pneumococci in hospitals, homes and asylums before and after outbreaks of pneumonia; (4) the vitality of the pneumococcus under various conditions; (5) a study of mouth disinfection. Although the various papers of these workers constitute the contents of the whole number of the *Journal of Experimental Medicine*, it must be confessed that the results are disappointing, and little more than a reaffirmation of what has long been known. The pneumococcus seems to have been found very frequently in the mouths and throats of apparently healthy persons, and differing little in virulency for rabbits and mice from the same organism obtained from persons with pneumonia. An interesting fact is that recorded by Norris and Pappenheimer to the effect that pneumococci are present, not only in the secretions of the mouth and throat, but actually in the lungs of all autopsies, and this, whether the lungs were normal or were the seat of pneumonic lesions. The significance of this discovery is, however, weakened by control experiments, which make it probable that the organism was carried into the lungs by fluids collecting in the mouth of the dying person and flowing down the air-passages during the transfer of the body.

In the course of a comparative study of pneumococci and streptococci, by Longcope and Fox, attention was directed to Rosenow's statement, that acid is formed in considerable amount in cultures of pneumococci in pneumonia serum, but not when serum from normal persons is used. Longcope and Fox found that this phenomenon is dependent upon the appearance in the serum, under certain conditions, of a substance from which the pneumococcus is capable of forming large quantities of acid. This substance is almost constantly present in the serum during an attack of pneumonia, but disappears after the crisis; what it is, and what occasions its presence in the blood during the pneumonic process, they were unable to determine satisfactorily. The practical significance of the presence in the blood of this substance is not apparent, but it may be protective in intention, as acid is definitely inimical to the growth of the pneumococcus. Certainly the subject invites further investigation. Some experiments of F. C. Wood, made to determine the viability of the pneumococcus after drying, are of interest as confirming what is known regarding the vulnerability of this organism. It is tenacious of life when undisturbed in moist or dried sputum kept in the dark, but exposure to sunlight kills it rapidly; oxygen is also fatal to its prolonged existence, for it was found that the organisms perished in from one to four hours in powdered sputum, even when kept in the dark. In coughing, sneezing, or even talking, a person suffering from pneumonia expels many fine droplets of saliva or sputum containing great numbers of the specific pneumococci; this danger to others seems to be minimised by the rapid death of these micro-organisms under the influence of fresh air and sunlight.

Epidemic Cerebro-spinal Meningitis.—At the commencement of the year an epidemic of this disease broke out in America. In New York alone, during February, 149 deaths occurred from this disease, and so serious was the view taken by the City Board of Health that a Special Commission was appointed to investigate the disease, and to endeavour to devise means to prevent its spread; this report is awaited with interest. About the same time over 400 cases occurred in the neighbourhood of Kattowitz, in Siberia, with a mortality of 37 per cent.; while in this country, a small localised outbreak was reported simultaneously at Irthlingborough, in Northamptonshire. Of all the epidemic diseases attacking mankind this affection, or cerebro-spinal fever, as it is sometimes called, offers some interesting problems for elucidation, and the possibility of its epidemic spread is a serious question for those in charge of

the public health. Although it is one of the most fatal of the acute diseases, yet owing to the peculiar local distribution of the epidemic it does not figure largely in the death returns. On the other hand, sporadic cases are by no means uncommon.

About the bacteriology of the disease a good deal is known, though the subject cannot as yet be said to have been thoroughly elucidated. The organism most frequently associated with the infection is the *Diplococcus intracellularis meningitidis* first described by Weichselbaum, who found it in the purulent exudate from cases of the disease, and affirmed the constancy of its presence in sections of the brain and its membranes. Councilman and Osler have confirmed this work by an extended series of observations. From all the evidence there seems to be no doubt that this diplococcus is the causal agent in a large proportion of cases at least; other bacteria which have been found occasionally in association with the disease are the pneumococcus and Friedländer's bacillus. With regard to the detection of the organism during life, the fact that it has frequently been identified in the cerebro-spinal fluid, withdrawn by lumbar puncture, makes this method of examination an important aid to diagnosis. Little is known about the channel by which infection with the *D. meningitidis* takes place, but evidence exists in support of the hypothesis that it may gain access to the brain directly by the nasal, auditory or other passages. The distribution of the micro-organism in nature is not known. The disease does not seem to be directly contagious, and is probably not transmitted by clothing or the excretions. In the present state of our knowledge it is difficult to understand how any particular epidemic arises; but in view of the fact that most outbreaks are localised and rarely widespread, the risks of an importation of the disease into this country from America or elsewhere are not very great. Farrar, in his report on the Irthlingborough outbreak (*Rep. Loc. Gov. Board*, No. 218, 1905), observes that the multiple invasions of houses, together with evidence that in three instances the first person to be attacked in a household had been in personal relations with the sick or with other members of a family already attacked, suggest that the disease was transmitted directly from person to person or by the families of the sufferers. There were, however, other circumstances which do not favour the explanation of direct personal infection. The most striking of these is the time which elapsed before attack in the case of persons more or less continuously in relation with the sick or residing in an invaded house. Farrar gives several instances of this kind, and specially points to

the circumstance that four teachers at one primary school living in different parts of the village were attacked, while no cases (with one doubtful exception) occurred among any of the children attending this school. No evidence could be obtained as to the prevalence of similar diseases in the neighbourhood of Irthlingborough, or as to the manner in which it became introduced into the village.

AIR-BORNE INFECTION FROM SMALL-POX HOSPITALS.—The recent reports to the Local Government Board, by Drs. Buchanan and Reece, upon the influence of small-pox hospitals in the dissemination of this disease in the respective towns of Gateshead and Liverpool, has given rise to much discussion during the past year as to the manner in which the infection of small-pox is carried, especially with regard to the air-borne theory. This is a very old controversy, dating back to the well-known report of Power on the Fulham Hospital, some twenty years ago, in which he, recalling familiar facts respecting the transit of floating particulate matter for considerable distances through the open air along lines of definite convection currents, suggested that in course of the many days in which a small-pox hospital is used during an epidemic, occasions now and then arise when infectious particles carried upwards from the hospital are conveyed by local air currents to places in the neighbourhood without undergoing any great degree of dispersion. The hypothesis of aërial convection depends on an assumption of the probability that it may occur, and, if this assumption be sound, affords a consistent explanation of the facts which exist apparently with regard to hospital influence, more particularly the recurrence and persistence of small-pox round the same hospital in different epidemics. The alternative theory is that all these phenomena of hospital influence result, in some way or other, from personal communication and traffic. Since Power's work, numerous instances of alleged hospital influence have occurred and been analysed, notably the case of the small-pox hulks in Long Reach, the Glasgow hospital at Belvedere, and more particularly the recent circumstances at Gateshead and Liverpool. Reece's report on the conditions prevailing at the last-named place is the most important contribution to the question which has appeared of late. In that city there were two old hospitals, Priory Road and Park Hill, and one new cne at Fazakerly, outside the city boundary. According to Reece, the inhabited areas within a mile of each of these three hospitals have suffered more severely from small-pox than the city as a whole, the exceptional incidence of the disease within these

areas corresponding, in point of time, with the use of these hospitals for the treatment of acute small-pox cases; further, broadly speaking, within these hospital areas, the dwellings nearer to hospital have sustained a heavier incidence from small-pox than those further away. These conclusions have been vigorously challenged by Dr. Hope, who points out that if hospital influence was the cause of the greater incidence in certain areas, how is it that the area around the Fazakerly building was more heavily affected, when that hospital is surrounded by an open space of 130 acres, while the other hospitals are in crowded areas? Further, in the vicinity of the Park Hill Hospital twelve distinct outbreaks of small-pox occurred before the hospital was opened and nine after the reception of patients. He asks, pertinently, why should these latter be ascribed to the influence of the hospital, while the other twelve were evidently independent of it? Besides, four of the nine outbreaks were proved to have been infected elsewhere. In fact, Hope shows that considerably more than half of the cases occurring within a mile of one or other of the hospitals are traceable to infection in other places, fifty-four had been overlooked and treated as chicken-pox in private houses, others travelled in trams, worked in shops or factories, attended the out-patient department of hospitals, or roamed the streets. In short, Hope maintains that the effects of hospital influence has been exaggerated, and that, in view of these instances which he quotes, if only the facts could be fully known, the results of so-called hospital influence can be explained from personal infection of this kind. This view was developed and defended by Newsholme, in a recent discussion before the Epidemiological Society (*Lancet*, May 20th, 1905), wherein, adopting the argument that it is impossible to prove a negative, he argued that it is practically impossible, in the case of the best administered hospital, to say that no communications have taken place between patients or infectious members of the staff on the one hand, and persons living near the hospital on the other; and that the hypothesis that numerous and persistent communications of this kind have, after all, occurred, is always to be preferred to the hypothesis of aërial convection. One must admit the question bristles with difficulties, but the more recent cases of hospital influence are not altogether easy to reconcile with this view, and certainly the hospitals lately concerned have been those of cities which leave little to be desired in the way of hospital organisation, administration, and readiness for emergency. Certainly many of the Liverpool cases are explicable by causes other than the vicinity of the

hospitals, but the experiences of Glasgow and Long Reach are a strong indictment as to the reality of so-called hospital influence. As to Gateshead, it is noteworthy that the so-called hospital influence was mainly felt in the district of Felling, which neither sent cases to the Gateshead Hospital, nor had any traffic or communication with that institution. Neither can unknown personal contact explain some cases at Monsall, where, in three days, small-pox appeared in four separate wards of the fever hospital, which adjoined the small-pox hospital, coincidentally with an outbreak in the outside neighbourhood. The fullest inquiries failed to trace personal communication in either set of cases, while both outbreaks are readily explicable by aëreal convection. It is, moreover, well known that no indication of malign hospital influence attaches to the case of institutions containing patients suffering from scarlet fever, diphtheria, or enteric fever; or in the case of hospitals receiving only convalescent cases of small-pox. Setting aside all bias, we must agree as to the reality of aërial convection at short distances, for all infection, other than by inoculation or ingestion, is through the air; we must further recognise that every outbreak of an infectious disease in crowded centres affords instances not only of aërial convection, but of personal infection and spread of disease from virulent concealed cases. We must be careful to maintain each of these factors in proper perspective, and, in all diseases, to admit and provide for every form of transmission, of which aërial convection is but one, though perhaps playing a more important part in small-pox than in others, and, judging from the analogy of other particulate matter, by no means confined to comparatively short distances. In any case, and whatever opinion may be held as to the merits or demerits of the air-borne theory, the building of small-pox hospitals in populous districts is probably a thing of the past.

THE CAUSE OF RETURN CASES OF INFECTIOUS DISEASE.—An important and interesting report on this subject by A. G. R. Cameron has been issued by the Metropolitan Asylums Board, dealing mainly with scarlet fever and diphtheria. The scarlet fever return cases appear to be most numerous during the winter months, but no close relationship is found between high infectivity rates and a short average period of detention in hospital. When the largest number of return cases occurred, the infecting cases suffered from mucous discharges after leaving hospital more frequently than during the remaining months. From the statistics given, it appears that between the ages of 4 and 10 years patients carry home infection more frequently than at any other age period, and that return

cases contracted in this way have a higher mortality than ordinary cases. Cameron is disposed to attribute the infection of return cases to such complications as nasal discharge in the patient rather than to failure of disinfection in the home or duration of detention in hospital, and believes that such complications lead to a recrudescence of infection, though nasal or aural discharges may not be necessarily infectious *per se.* He concludes that return cases of scarlet fever are due to premature discharge from hospital, even though the infecting case may have been detained longer than usual; as a rule, this premature discharge cannot be foreseen. It is recommended that for patients, particularly those predisposed to mucous discharges, the usual warm bath should not be given immediately before discharge, but on the previous evening.

Similar general conclusions are made in respect of diphtheria, though return cases are less common after this disease than after scarlet fever, and a larger proportion of alleged cases are doubtful or explicable as coincidences. The value of this report is much enhanced by critical remarks made by the superintendents of the Board's hospitals; they make the significant observation that "in the present state of our knowledge it is difficult to see how the occurrence of return cases of either of these diseases can be prevented either in home-treated, or hospital-treated patients." These views are practically an endorsement of Cameron's conclusions. All modern experience goes to show that the evidence is strong that the infectivity of scarlet fever lies not in the desquamating cuticle, but in the throat and nasal cavities; the beneficial influence of hospital treatment in the incidence of either scarlet fever or diphtheria, cannot be realised to the fullest extent without cooperation on the part of parents, doctors and sanitary authorities.

THE PROBLEM OF TUBERCULOSIS.—The chief interest in this field of work during the year, has centred round efforts to secure a cure, or prevention, for the tuberculous process, rather than work directed to unravel the mysteries of its etiology. For this we are mainly indebted to Behring's communication to the International Congress on Tuberculosis. Preliminary to reviewing this question it may be advantageous to refer briefly to the characters and alleged specific actions of the more important tuberculins or so-called remedies for this affection. The original tuberculin of Koch was a clear brownish fluid, obtained by filtering through a porcelain filter a glycerine broth culture of tubercle bacilli which had been evaporated over a water-bath to one tenth of its volume. When injected in small doses into persons or animals suffering from

tuberculosis a marked rise in temperature resulted, accompanied by an inflammatory reaction around any tuberculous foci present in the body. This reaction involved a necrotic change in the tuberculous foci, leading to the disintegration of the diseased tissue and a liberation of any living tubercle bacilli contained in it. An appreciation of the risks attaching to this facilitated dissemination of the infective organisms from tuberculous foci, indicated that this tuberculin could not be used with safety for prophylactic purposes. As a result of further work, Koch adopted a new method of preparing tuberculin. Highly virulent cultures of tubercle bacilli were carefully dried and finely triturated in an agate mortar, whereby the bacilli were reduced to fragments, and the specific substances which they contained, being liberated from the fatty substance which surrounds the bacillus, rendered capable of passing easily into solution. To these finely triturated bacilli, distilled water was added and the mixture centrifugalised, the result being a separation into an upper opalescent layer containing no bacilli and a lower layer of deposit. This deposit, after drying and trituration, was mixed with water and centrifugalised; this process was repeated until the transparent layer after centrifugalisation became perfectly clear. Koch distinguished the opalescent upper layer obtained after the first centrifugalisation as T.O., while the clear upper layer obtained by further treatment he designated T.R. Owing to the fact that glycerine gives a precipitate with T.R. but not with T.O., the latter may be regarded as containing those elements of the bacilli which are soluble in glycerine and comparable to the old or original tuberculin. The T.R., on the other hand, is apparently free from the dangerous properties of the other two preparations, but contains valuable bacillary substances insoluble in glycerine. Moreover, many observations have shown that T.R. possesses distinct immunising powers, and, in spite of certain objections to its nature, constitutes the chief basis of the anti-tuberculous vaccines of the present day.

During the past year a new aspect has been given to the efforts towards a successful prophylaxis and cure of tuberculosis in man by Behring's communication to the Paris Congress. The fundamental conception of his new method appears to be the production of a cellular rather than a humoral or anti-toxic immunity; this he maintains can be secured by a modified constituent of the tubercle bacillus. This substance he tentatively terms T.C. when it exists in its native state, but when it is modified by the cellular activity of the body he refers to it as T.X. Behring maintains that in the process of immunisation of cattle against tuberculosis the T.C. is

separated from other substances in the bodies of the tubercle bacilli, and exercises a specific action on the tissue cells of lymphoid organs. He regards this substance T.C. as the cause on the one hand of the reaction to Koch's original tuberculin, and on the other hand of the protective reaction against tuberculosis. In order to free the T.C. from the substances which hinder its therapeutic action, it is necessary to distinguish three groups of constituents in tubercle bacilli: First, a substance soluble in water which possesses a fermentative and catalytic action; this Behring refers to as T.V., and regards it as representing the toxic factor of Koch's tuberculin. Secondly, there is a globulin, called T.G.L., soluble in a 10 per cent. solution of sodium chloride; it is toxic also. Thirdly, there are several non-toxic substances which are soluble in alcohol, ether and chloroform. When the tubercle bacillus has been freed from these three groups of substances there remains only a body which he calls the "rest" bacillus, retaining the shape and all the staining reactions of the tubercle bacillus itself. This rest bacillus can be transformed into an amorphous substance capable of being absorbed by the lymphoid cells of animals; the cells then assume oxyphile or eosinophile characters, and coincidently with this change the condition of immunity develops. A point of great importance in Behring's utterances is that he believes that the T.C. can be elaborated *in vitro* in such a manner as to be capable of utilisation in the treatment of human tuberculosis. So far the evidence in support of this belief has not been published, but Behring's previous work in regard to the preparation of diphtheria antitoxin, has been so brilliant and successful that we entertain hopes that his confidence in this new work will be justified.

Leaving these more or less theoretical considerations as to the possible line of cure in tuberculosis, we may review the facts and principles which have led to practical results during the year. This mainly resolves itself into a reconsideration of tuberculin therapy, as originally put forward by Koch, and the adoption or recognition of entirely new conceptions as to its practical application. For this we are mainly indebted to the work of our old colleague, A. E. Wright, whose achievements in the treatment of the localised forms of tubercle is a dominant feature in the advances made during the past year in this branch of medicine. It has long been recognised that against bacterial diseases the mechanism of defence in our bodies consists probably in the production of protective substances which, entering the blood stream, are carried in this stream throughout the body. We need not inquire here where these substances

are formed; it is sufficient to know that these chemical protective substances can be demonstrated in the blood of healthy persons, and further, that they are created by the host. Whatever be the source and mode of origin of these protective substances they suffer remarkable changes in quantity when an infection takes place, or when a "vaccine" is introduced into the body artificially; these changes have been described by Wright as the "law of the ebb, flow and reflow, and subsequent maintained high tide of immunity." As readers of this Journal know, the study of immunity against bacteria has led to the expression of the greatest diversity of opinion as to what is the nature and action of the protective agencies, some claiming anti-toxic properties, others lytic, and some phagocytic attributes. By their work in 1903, Wright and Douglas (*Proc. Roy. Soc.*, vols. lxxii. and lxxiii.) made a notable advance towards the solution of this question by showing that substances—opsonins—exist in the blood serum, and whose function is, in some way, to alter microbes so that they may fall an easy prey to the phagocytes or leucocytes. The general accuracy of this work is now recognised, but the exact nature of the opsonic action has not yet been worked out. All investigators, however, are agreed that where different bloods are compared the variable factor is the serum and not the leucocytes. The existence of Metchnikoff's hypothetical stimulins, or bodies which stimulate the leucocytes, still lacks exact demonstration in respect of tuberculosis, though some suggestive work as to their nature *quâ* enteric fever has been done by Leishman (*Trans. Path. Soc. Lond.*, vol. lvi., pt. iii., 1905). The relation of the leucocytosis, which accompanies most bacterial infections, to the opsonic content of the serum is equally obscure, though Bullock and Ledingham, in a large number of experiments, failed to show that there is any close relationship between these factors.

The practical importance of these researches consists in their relation to the question of the treatment of infections by the inoculation of vaccines, especially that of tuberculosis by tuberculin. Here again Wright's work during the year is of importance, as he has shown (*Lancet*, 1905, vol. ii., pp. 1598 and 1677) that the chief defensive work against tubercle exists in the serum and not in the cells as was believed, and that the destruction of the bacilli by the body cells must be preceded by the action of the serum. He further shows that the opsonic content or index of individuals suffering from tuberculosis is lower than that of normal people, and that the tuberculous opsonic content of the serum can be increased by the inoculation of tuberculin. It is, further, noteworthy that

following the inoculation of tuberculin there is an ebb of protective substances as represented by tuberculous opsonins, or as Wright calls it, the negative phase. The negative phase seems to be variable; in some cases the ebb or fall is abrupt, in others the negative phase may persist over a number of days. The recognition of this negative phase is of vital importance in the administration of tuberculin, as shown by the observations of Lawson and Stewart (*Lancet*, 1905, vol. ii., p. 1679), who point out that the administration of tuberculin during the existence of a negative phase tends to the production of more harm than good, as it means the releasing of numbers of tubercle bacilli from foci into the general circulation at a time when the serum of the blood is least able to destroy them. If this period be avoided, the general results of tuberculin inoculation in a considerable number of cases has been distinctly favourable. In fact, all the evidence goes to show that, provided it be given in very small doses, say from $\frac{1}{1000}$ to $\frac{1}{800}$ milligramme of the powder and with due regard to the absence of a negative opsonic phase, we have in tuberculin (T. R.) a substance which possesses remarkable curative powers in tuberculosis. It is obvious that the last word has not been said upon this matter, but so far as this year's work is concerned it must be conceded that a distinct advance has been made and in a direction in which the outlook was the least hopeful.

As to the relation between human and animal tuberculosis we await still the report of the British Royal Commission, but the year's discussions indicate that we are hearing less of the contention that bovine and human tuberculosis are not reciprocally infective; while recent research, including the report made this year by the German Commission, points to an opposite conclusion. Of recent work, some interesting experiments have been made by Calmette and Guérin (*Ann. de l'Institut Pasteur*, Oct. 25th, 1905, p. 601) upon goats to test the validity of Behring's assertion that adult pulmonary tuberculosis is not due to infection by the respiratory tract but of intestinal origin, and almost always of an intestinal infection contracted in early life. They selected healthy goats which were in an advanced stage of gestation, and by means of a tube inserted into the lacteal ducts, inoculated into the mammary glands of these animals cultures of bovine, human and avian tuberculosis. The goats which received the bovine bacilli became ill and all died in less than sixty days, though the tubercular disease did not in most cases show much extension beyond the mammary gland. Those inoculated with the human bacilli in the same doses

suffered much less severely, and in three months had regained their normal health. Those inoculated with the avian bacilli were even less affected. Each goat was kept with its own offspring and isolated, the young being given every opportunity to suck their mother's milk. The kids sucking milk containing bovine bacilli exhibited mal-nutrition very markedly, and those killed or which died, showed extensive tuberculous lesions in the mesenteric and other glands, as well as in the lungs. In the kids fed on milk containing human bacilli, although the mesenteric glands were affected the disease had not spread further. The kids fed with milk containing avian tubercle bacilli remained practically well. In addition to the foregoing, other experiments were made on young kids by introducing cultures of bacilli into the stomach by means of an œsophageal tube. All the animals fed with bovine bacilli developed acute disease of the lungs, mesenteric and thoracic glands. The animals fed with the other strains of tubercle bacilli remained unaffected. These results are clearly in support of the view that the intestinal tract, in early life, is the portal of entry for tubercle bacilli of bovine origin leading to the production of pulmonary tuberculosis; but, contrary to Behring's view, when similar feeding experiments were made upon adult goats, almost identical results were obtained. On these facts, Calmette and Guérin reject Behring's view that the pulmonary tuberculosis of the adult is due to an intestinal infection contracted in early life, but they insist, on the contrary, that the adult is, if anything, more susceptible to pulmonary infection by the intestinal route than the infant. In spite of the apparent success of these experiments, one must confess to difficulty in accepting the conclusions absolutely, though they constitute a valuable contribution to the study of tuberculosis. To a large extent in confirmation of the foregoing experiments on goats, are the results of some on calves made by Vallée (*Ann. de l'Institut Pasteur*, Oct. 25th, 1905, p. 653), from which we are forced to the conclusion that tuberculosis due to an infection through the alimentary tract is probably much commoner in man than is generally supposed.

As regards indirect means of preventing tuberculosis, the year has been rich in abundance of effort. On the value of sanatoriums as a means of reducing the prevalence of pulmonary tuberculosis, and as to the extent to which it is desirable to urge provision and organised effort out of public funds for the segregation on a large scale of more advanced cases of the disease, considerable differences of opinion exist, so much so that in the present state of our know-

ledge it is desirable to suspend judgment. On the other hand, reports from all parts continue to illustrate the value of the work which is being done to ameliorate the conditions of housing and living which foster tuberculosis, and urge the need for further effort by local authorities in this direction.

THE LINCOLN OUTBREAK OF ENTERIC FEVER.—Those of us who have been sufficiently impressed with "the tolerance of enteric in the Army," will appreciate the object lesson presented by the experiences of the city of Lincoln during the past year. Few outbreaks of enteric fever have afforded a more striking instance of catastrophe resulting from contamination of a public water supply. The outbreak began on January 22nd and continued until June 21st, 1905. In the first two weeks some 400 persons were attacked, during the next eight weeks about 500 other cases occurred, while, including a considerable crop of secondary cases, the total number of persons attacked in Lincoln during the first half of the year amounted to 1,021, constituting some 2 per cent. of the total population, with a death-roll of 120. In spite of much attention devoted to this outbreak, it is not clear how or where the infection was first introduced, but all the facts point to one common cause, restricted either in virulence or in distribution at the outset, and subsequently becoming more diffused and spreading with explosive violence about the third week in January. For more than twenty years Lincoln has had exceptional difficulty in finding sufficient quantities of safe water for its inhabitants. The only sources of water available are the River Witham and its tributaries, all of which have long been known to be constantly contaminated with sewage and other manurial matter contributed from manured land, cottages, &c., adjacent to the streams. The water drawn from these doubtful sources was submitted to sand filtration before distribution, a process which, if conducted under certain well-defined conditions, might be expected to have rendered even so doubtful a water reasonably safe. Unfortunately, the conditions essential to efficient filtration seem to have been wanting, certainly for a while during December, 1904, and early January, 1905, when the onset of frost and the undue hastening of the rate of filtration completely broke down the defences for safeguarding the public health. Undoubtedly the distribution of an imperfectly filtered water drawn primarily from sources open to persistent sewage pollution, was the direct cause of this epidemic. A critical study of the various concurrent circumstances in connection with the outbreak makes it clear that its magnitude and distribution were probably influenced by other factors.

For example, it is difficult to eliminate in a certain number of cases the possibility of infection by means of sewer air, as the epidemic prevailed not only where the Witham water was drunk, but where air from the sewers could more easily penetrate the dwellings. This arose from the fact that the sewers of Lincoln are much too small for the normal volume of sewage flowing through them: moreover, it is admitted that there was an increase over the normal quantity of sewage equal to about 25 per cent. for a few weeks preceding the outbreak. This means that for some weeks before the commencement of the outbreak the sewers were water-logged to a larger extent than usual, and that there was extra back pressure and a forcing out of the sewers of a larger amount of sewer air and associated gases. In this connection it is noteworthy that those parts of the town where there were greatest facilities for the escape of sewer air suffered more than those localities having fewer sewer air outlets; these differences of incidence were quite unconnected with either quality and style of house or social grading of the people.

Another curious feature about this enteric outbreak is the remarkable age distribution of cases. Up to March 1st, among those under 15 years of age, there were 172 cases among males and only 115 among females. Among those over 15 years of age during the same period, there were 266 male cases and only 179 female; it may be legitimately asked, if the contamination of the water was the sole cause, why these extraordinary differences? It can hardly be explained by the idea that men having to do hard manual work drink more water than women do, as the greatest discrepancy occurred during the ages from 6 to 10 years, where there were only 38 cases among the girls and as many as 85 among the boys; at these ages boys do not do severe manual work. Apart from these interesting epidemiological features, this outbreak at Lincoln affords a convincing demonstration of the danger of taking water from contaminated sources and relying upon sand filtration to remove all primary risks; it suggests also the importance of sound minor sanitary arrangements in safeguarding the community from secondary risks; while the supineness and dilatoriness displayed by the local authorities towards putting their town in order, in spite of repeated warnings from their own health officer and the Local Government Board, give rise to considerable misgivings as to the efficiency of the disciplinary or administrative control exercised by the central over the local authority in matters of this kind.

Not the least interesting fact in connection with this epidemic

is the success which appears to have resulted from the attempt to purify the town water supply in bulk by chemical means. Sodium hypochlorite was the re-agent used, containing about 12 per cent. of free or available chlorine. This was applied in proportions of 1 part of the salt to from 10,000 to 1,000,000 parts of the water, but so far as one can judge a ratio of about 1 to 100,000, or, say, 7 grains to each 10 gallons of water, was the smallest amount yielding satisfactory results. By giving sufficiently small a dose and a prolonged contact, dechlorination of the water seems to have been unnecessary, though the treated water is said to have had a mawkish or so-called "spent" taste. The result of this treatment of the Lincoln water appears to have been distinctly successful, as over 75 per cent. of the treated water samples have contained no *B. coli* in 100 cc. of the water. The practical lesson of this gigantic experiment in civil life is not without meaning to some of us called upon to cope with similar facts under very dissimilar conditions.

THE CANCER PROBLEM.—The results of recent investigation into cancer are leading undoubtedly to a better conception of this subject, and the lines of inquiry promising the best results have been essentially biological in character. For the major portion of this good work we are indebted to Bashford and Murray, investigating on behalf of the Cancer Research Fund, while others, notably Farmer, Moore and Walker, have contributed largely to our knowledge of the cytological characteristics of malignant new growths in man. The occurrence in cancer of those types of cell division, which had hitherto been regarded as peculiar to the reproductive tissues, has been interpreted by these latter workers to signify that malignant new growths are virtually reproductive tissues. Bashford and Murray dissent somewhat from this view, and maintain that the occurrence of these peculiar mitoses or modes of cell division are to be regarded merely as a phase in the life-history of malignant new growths, which are not built up solely of cells comparable to those in normal reproductive tissue. They point out that the potentialities residing in cancer cells can be exemplified by observations on the transmissibility of cancer from one animal to another. It has been demonstrated that in successful transmission, the tumours which arise are the genealogical descendants of the cells actually introduced. Further, the artificial transplantation of a malignant tumour is not to be regarded as throwing any light upon the origin of cancer, but merely as demonstrating that the proliferative activity of its cells can persist for a long time; in other

words, cancer is an irregular and localised manifestation of a process otherwise natural to the life-cycle of all organisms.

Inasmuch as we know so little of the true meaning of the nuclear changes in cell division, we confess to considerable sympathy with those who question the theory of an etiology for cancer based upon the view that, because the mitotic changes in cancer resemble very closely the mitotic changes in reproductive tissue, there is necessarily an identity in the physiological processes of these two tissues. The proposition to be discussed or kept in view is rather that a somatic cell may undergo functional involution, and in so doing may resume the characters of a primitive cell, and that a colony of such cells forms what is called a tumour. Clinically, the evidence is strong in favour of tumour cells having lost their normal function, and that a cancer may flourish while all the other tissues are wasting; in old people a cancer arises frequently in an organ, or part which is undergoing involution. Involution is merely a phase of life synonymous with a lessened functional activity. A simple instance where a cell having lost its normal function involves to a primitive type, is seen when a fat cell undergoes atrophy; the fat slowly vanishes and the cell becomes connective tissue, and this in turn may organise into fibrous tissue. That involution is a frequent forerunner of cancer is explicable, because the cell has lost its functions and tends to resume the exuberant growths of the primitive protoplasm; just as a somatic cell has evolved from the general to the special, so a tumour or cancer cell has involved from the special to the general. There is, however, another aspect of the problem. Is it possible that the presence of nerves in certain tissues acts like a brake or check on cell production? There is much to emphasise the apparent relations between carcinoma and nerve or trophic areas. If we think of nerve and epithelium as two diverging lines arising from a common epiblast, it is conceivable that nerve tissue, either from over specialisation or lessened function, might so lose control over or fail to keep pace with the epithelial cell, which proliferating rapidly from irritation, frees itself from nerve influence. The presence of nerves in cases of certain slow-growing fibromyomata and their absence in certain rapid-growing tumours lends support to this view.

Quite apart from their cytological researches, the workers for the Imperial Cancer Research Fund have established that cancerous processes are identical in all vertebrate animals, and that both in short-lived and long-lived animals their incidence increases with advancing age. That this is true for sarcoma as well as for carcinoma, suggests

the view taken by Bashford, that these are manifestations in different tissues of an essentially similar process. Experiments in engrafting cancerous growths in mice, show that the processes by which cancer cells are transferred to a new individual are fundamentally different from all the known processes of infection. This necessitates either the abandonment of the view that cancer is due to an infective process, or the recognition of some new method of infection quite unknown. The age-incidence of cancer is a factor of the first importance, and the failure to recognise the frequency of the occurrence of sporadic cancer in aged animals vitiates the value of transplantation experiments when made on other than young animals. It has to be recognised, too, that two years of age in one species of animal may correspond to 60 years of age in another. Bashford's observations on mice and other animals render it highly probable that, when the true facts corrected for age-distribution of the animals in each species are known, the incidence of cancer in such animals as cattle, horses, mice, &c., will approximate to that in man. This being so it is clear that our outlook hitherto on the causation of cancer has been too limited. If cancer occurs, as it evidently does, in wild as well as in tame animals, in savage as well as in civilised man, the essential factors in its causation are probably remote from civilised life. The one dominant note in all this recent statistical work on cancer is the relationship between the process and the span of life, and this leads us back again to the reiteration of the view that in its essential nature cancer tissue is but an involution of special cells to primitive types. There is nothing in the investigations of the Imperial Cancer Research Fund which points to an actual increase in the death-rate from cancer; but they emphasise the fundamental importance of a knowledge of the proportionate number of individuals of different ages in any group of men or animals, when estimating the relative recorded frequency as distinct from the absolute incidence of cancer among them.

THE FALLING BIRTH-RATE.—In previous reports a reference has been made to this subject, but I offer no apology for returning to it, for its importance and scientific interest is very great. Everyone concerned for the greatness of our nation is deploring the serious fall in the birth-rate which, setting in some years ago, has culminated this last year as the lowest on record, or 27·2 per 1,000 persons living. All agree that, if we are to hold our own with foreign countries, we must have plenty of children to furnish workers, and, if it be necessary, fighters on land and sea. So true

is this, that unusual prominence has been given, both in the press and elsewhere, to the social and economic bearing of this dominant feature of our national vital statistics, many interpreting the facts not only as evidence of moral decadence but also as a symptom of physical deterioration. There is reason to think that possibly these pessimists take too narrow a view of the question ; whether this be so or not, it is incumbent upon ourselves to consider the subject scientifically.

It will be conceded that the moral aspect of the question is one of unusual delicacy and, too, not to be ignored, but, recognising that it is not my province here to sit in judgment on the motives of individuals, I propose merely to recognise and inquire into the consequences of facts as they exist. Now, the first thing we have to grasp is the fact that the birth-rate is falling, not merely in this country, but in all civilised countries, with the exception of Russia and Japan. We may dismiss at once, as chimerical, the idea that this is due to any failure in vitality of civilised races or to the existence of any progressive inherited degeneration of peoples. The truth is that, in civilisation, the birth-rate is falling simply because the public desires that it shall fall. The significance of this may be readily over-estimated, but let us understand that a falling birth-rate is perfectly compatible with a rapidly increasing population and with an acceleration in the increase of the population, if the death-rate falls with sufficient rapidity. In our own case, the death-rate last year was 15·2 per 1,000 persons living, and, moreover, it has shown a steady diminution for many years, with the result that in the first half of the nineteenth century the population of England doubled ; in the second half it increased 81 per cent. ; during the decade (1891-1900) there were added to the population of England 3½ million people. This same figure applies roughly to the United Kingdom (3,721,600) as the decrease of Ireland was practically neutralised by the increase of Scotland. But during this time, we sent 898,000 emigrants to other lands, making the actual increase of the population during the decade over 11 per cent., and the natural increase, or excess of births over deaths, over 12 per cent. If the present birth-rate and death-rate continue and emigration increases proportionally to population, we may anticipate, about 1980, that the people of these islands will be quite 80 million souls, or about double our present-day population. One need not pause to discuss of what magnitude will be the housing problem in that day or what will be the density of population in the larger towns ; the evils of our own day are sufficiently

embarrassing. A diminishing population, or even a stationary one, as in France, may be and probably is a grave national danger; but in our own case, so long as our birth-rate exceeds our death-rate in its present proportions, we have nothing to fear except lack of employment and want of support for our increasing population. If the actual rate of increase in our population be suggestive of gloomy forebodings to the statistician, would it not be better to dwell less upon the falling birth-rate, but rather dwell more upon the need of checking wasteful expenditure of life and, by so adding to our national income in this respect, secure a more favourable balance? The destruction of infant life in this country has long been a crying disgrace to our civilisation, and it would appear more appalling were it not that other countries can tell a worse tale. The figures are sufficiently striking. For the ten years 1895-1904 the percentage death-rate of children under one year of age was 15·6 of the birth-rate for the whole country. During 1904, the death-rate per 1,000 births in London was 146, while in Blackburn it was 191, in Liverpool 196, and in Birmingham 197, meanwhile, in Southampton it was only 115, and in Willesden 114, and even these relatively good ratios are far above the figure for Melbourne during the same year, namely 83. Surely it is not too much to expect that the infantile death-rate in our rural and urban communities should be kept down to something below 10 per cent. Were such the case it is easy to realise the increase in population which would result from the saving in infant life, a substantial part of which survivors might hope to reach adult age. There can be little doubt that if we could abolish the infantile mortality which now prevails we might allow the birth-rate to fall lower than it is at present and yet have nothing but gain in every direction.

There is, however, another aspect of the question which needs to be borne in mind, and that is the relative fertility of various classes of the community. Karl Pearson has been very explicit on this point, and goes so far as to say that the fall in the birth-rate is due to the relative infertility of the most valuable stocks in the race; he, moreover, attributes to this fact the present dearth of ability, or, in other words, the survival of the less able. Unfortunately, we are not in possession of precise data, but we know in general that the upper classes are less fertile than the middle classes, and these less fertile than the lower classes. A birth-rate of 11 in Mayfair is met with one of 60 in Poplar or Stepney, the figure for the general population being about 27. These are facts which must

make us ponder and suggest the need of our attempting to improve the race by attention not to the quantity but to the quality of the births. The policy of the future must be to lessen the enormous wastage of life which now goes on amongst infants, for the birth-rate will certainly continue to fall as the natural result of human will and the outcome of certain knowledge. That knowledge is being diffused steadily downwards into the lower social grades, but when that knowledge, which is now the property of the relatively few, is common property, then the present disturbing factor in the proportion of the birth-rate contributed by different classes of the community will disappear and the average quality of the births rise.

BUBONIC PLAGUE IN CAPE COLONY.

By Dr. J. A. MITCHELL.
Assistant Medical Officer of Health for Cape Colony.

(*Continued from page* 144.)

V.—Modes of Infection and Spread.

From the history of the disease in this Colony, the salient points of which I have endeavoured to put before you as briefly as possible, the following conclusions may, I think, be drawn :—

(1) That rats have, directly or indirectly, been the means of introducing the disease into the Ports of the Colony.

(2) That rats have, directly or indirectly, been the means of spreading the infection from infected centres in the Colony to other centres.

(3) That in the great majority of cases of the disease in man the infection has been more or less clearly traceable to infected rodents.

(4) That rodents have been the chief cause of the persistence of the disease in infected localities.

Regarding the first and second of these points, a number of instances have been observed in which live rats have come ashore from vessels, or been carried long distances by rail or otherwise, in bales of forage or in " skeleton " or partially open cases or crates of goods, such as crockery, hardware and fruit, or other articles packed in straw or other similar packing. Sick rats are probably more likely to remain in a bale of forage or crate of merchandise during loading, unloading or transit than healthy ones. Again, a rat sick from plague may enter and die in a bale of forage or in a " skeleton " crate, and the carcase may be carried long distances by sea or rail. We know from laboratory experiments that such carcases remain infectious for a considerable period—probably for several months—when covered up so that desiccation is retarded. On arrival of the bale or crate at its destination, local rats are likely to investigate its contents, perhaps devouring the carcase of the dead rat, and thus becoming infected. Or again, if merchandise such as that referred to be stored where there are plague-infected rodents it is likely to be contaminated by their naso-oral discharges and excreta, and, if subsequently removed to another locality—unless the conditions and lapse of time allow of complete devitalisation of the infection by desiccation—is liable to transmit the infec-

tion to the rat population of the latter. There can be no reasonable doubt that plague has been introduced into Cape Town, Simon's Town, Port Elizabeth, East London, Mossel Bay, and Knysna, and from one or other of these Ports carried—by rail, except in the case of Seymour—to King William's Town, Graaff-Reinet, Burghersdorp, Kei Road, Imvani, Queenstown and Thomas River, in one or other of these three ways, viz., either by plague-infected live rats, the carcase of rats dead from plague, or by merchandise or articles contaminated by the discharges of infected rodents. There is, further, little doubt that the infection was introduced to Durban, conveyed from Durban to Maritzburg, and conveyed to Johannesburg from either Durban, East London or Port Elizabeth in one or other of these ways.

In connection with the first point—the causes of infection in human cases—of the 534 cases which have occurred in the Colony up to the 15th ultimo—exclusive of Cape Town cases, the records of which on this particular point are, as already stated, imperfect—the adjudged sources of infection were as follows: Infected rats, 347 or 64·98 per cent.; infected cats, 3 or ·56 per cent.; fomites (infected clothing, &c.), 10 or 1·87 per cent.; pre-existing human cases, 62 or 11·61 per cent.; whilst in 112 or 20·97 per cent. the source is doubtful. In a large proportion of the latter, however, there is a strong presumption in favour of rats as a source of infection. It is noteworthy that of the 87 purely pneumonic cases, in 24 or 27·59 per cent. the adjudged source of infection was a pre-existing case in man. In one of the Cape Town cases—not included in the foregoing figures—there was a clear history of infection by a plague-infected cat; in another, that of the Chaplain to the Plague Hospital, the evidence, though not conclusive, was in favour of a similar cause.

Without going in any detail into the much discussed question of the mode of spread of the infection amongst rats, and of its transmission from rats to man, I may mention that in numerous experiments with guinea-pigs, rats and rabbits placed in wire cages side by side with flea-infested and plague-infected animals, no case of the transmission of the disease to a healthy animal has occurred. The view has recently been advanced, more especially by Dr. Hunter of Hong Kong, that plague infection does not as a rule enter the system through the skin, even in bubonic cases, but that the disease is always a septicæmia *ab initio*. The considerations put forward in favour of this view are briefly: (1) that plague bacilli are demonstrable in the blood in a large percentage,

probably, in the majority of bubonic cases, in the early stages of the disease ; (2) that the bubo frequently appears some time, perhaps several days, after the onset of the illness; (3) that where infection does occur in a skin area draining to a certain group of lymphatic glands, a bubo in an altogether different group of glands may result; (4) that multiple buboes frequently develop simultaneously; (5) that plague bacilli are usually present in pustules, carbuncles, extravasations and similar lesions, even in the early stages of the disease, and are also frequently demonstrable in the excreta.

In the bubonic cases which have occurred in this Colony primary buboes have almost invariably appeared at a very early stage of the illness; also in the comparatively small number of cases in which the place of entrance of the infection could be ascertained with reasonable certainty, the primary bubo developed in the group of glands draining the place of infection, though in some cases buboes developed in other groups of glands subsequently. The following instances may be quoted :—

(1) Dr. J. C. Dunlop. Scratched left little finger during a *post-mortem* examination on a case of pneumonic plague on March 23rd, 1901, ill March 26th, bubo in outer group of glands in left axilla. No reaction took place at the site of the scratch, which was almost quite healed on admission to hospital on March 27th. The attack terminated fatally.

(2) European, male, aged 18. On or about March 6th, 1901, struck a man on the mouth with his left fist, thereby receiving a small wound on the knuckle of the left middle finger. Became ill on March 13th and was admitted to hospital two days later with a bubo in the outer group of glands in the left axilla. The wound over the left knuckle was inflamed and suppurating, *B. pestis* being found in the discharge. Two deep cervical glands, one on each side of the neck, subsequently enlarged. The man whose tooth had caused the wound on the patient's knuckle was healthy at the time of the assault and remained so.

(3) European, male, aged 34, labourer, employed on the Removal Staff of the Plague Department. On April 14th, 1901, had his right hand cut by the edge of a pail over which he was holding a child who was suffering from plague. The child passed a loose motion over the wounded hand. An open veldt sore on the other hand was soiled with fæces. The patient became ill on April 18th, and on the following day a bubo developed in each axilla. Before admission to hospital on April 21st, buboes had also developed in each groin

and in both sides of the neck. There was a slight local reaction in the wounds on the hands, but no plague bacilli were to be found in the discharges.

(4) Native, female, aged 25. Had been nursing her infant who died on March 12th, 1901, a *post-mortem* diagnosis of pneumonic plague being made. Admitted to Contact Camp, Uitvlugt, on March 13th, transferred to hospital on the following day with the general symptoms of plague and a bubo immediately above the right clavicle. On the day after admission to hospital a second bubo developed in the "pectoral" chain of glands in the left axilla. The situation of the first-mentioned bubo was unusual; it seems highly probable that the infection reached one or both the infected glands by absorption from the nipple.

(5) European, female, aged 19. Had assisted in nursing and had frequently kissed a patient, her fiancé, who was discovered to be suffering from pneumonic plague on the evening of March 29th, 1901, and died on the following morning. She was admitted to the Contact Camp, Uitvlugt, on April 1st, and transferred to an Observation Ward on the following day. On April 5th a deeply-seated bubo developed at the angle of the jaw on the right side and she was transferred to a Plague Ward.

Broadly speaking, experience in this Colony would appear to lend support to the view that in the majority of cases of the bubonic type infection enters by way of the skin—or, in the case of cervical buboes, through the buccal mucosa — and that the first local symptoms usually make their appearance in the lymphatic glands to which the place of entrance drains, but that infection becomes to a greater or less extent systemic at an early stage of the disease, perhaps in some cases before local glandular symptoms have developed sufficiently to attract attention.

VI.—Transmission of Infection from Man to Rodents.

The question may be asked, can the infection of plague be transmitted from man to rats, and if so, what are the risks of such an occurrence? Is the introduction of a case in man into a place with a large rodent population likely to lead to the infection of the latter? Experience in this Colony goes to show that the risks of such transmission are small. In no instance has an exported case of plague in man given rise to a fresh epidemic, though in several instances one or more cases in immediate contacts of the exported case have occurred. Plague-infected rats have been found on two occasions at the Plague Hospital at Port Elizabeth, but as the

hospital is less than half a mile distant from the town, the infection may have been derived from the latter. Although there was a considerable number of rats about the Cape Town Plague Hospital at Maitland during the 1901 epidemic they remained healthy.

The only instance which has been observed in this Colony in which there seems a distinct probability that the infection was transmitted from man to rats recently occurred at East London, for particulars of which I am indebted to Dr. E. N. Thornton, Government Plague Officer there. The greater part of the town of East London is situated on the East Bank of the Buffalo River. On the West Bank is a small township of about 100 houses with several stores and other buildings, and about half a mile distant from this is a small native location. Communication between the two banks of the river is by boat and pontoon. Up to the occurrence now referred to the West Bank had remained free from indigenous plague. In June last two native children were found dead of plague in a hut in this location after an illness of three and four days respectively, infection being clearly traceable to the East Bank Location, where the children had a few days before been spending the night; shortly after another case of plague occurred amongst the inmates of the hut they had slept in. The disease in both cases was of the acute pneumonic type, with profuse discharge of infectious sputum. The hut in the East Bank Location, which was disinfected on June 19th, showed recent indications of infestation, but only one live rat, which was healthy, was found. On July 4th, another case of plague occurred in a hut about twenty yards distant from that first mentioned, and in this latter hut four rats, recently dead of plague, were found. A careful inspection of the remainder of the location, the West Bank Town-ship and the pontoon and vessels in the river, failed to reveal any further evidence of plague infection.

VII.—Persistence of Infection.

The question of the causes of the persistence of infection in infected localities is one of very great practical importance. Experience in this Colony tends to show that infection may persist for a considerable time—possibly for a couple of months or longer—in burrows and under-floor spaces in buildings which are believed to have been cleared of rodents. It is, however (generally), impossible to make quite certain of the complete absence of rats and also that infection has not been re-introduced. According to granary experiments carried out in Natal and published in a Report by

Dr. Hill, Health Officer for Natal, issued in 1904, in stores and similar buildings infested by plague rodents infection persisted for more than a month but for less than two months after the removal of all infected rodents and carcases.

The infection probably persists in burrows, nesting and rubbish contaminated by infectious excreta, though here again the ubiquitous flea may play a part.

Whilst rats undoubtedly play the major *rôle* in this continuance of infection, there is no doubt that mice also play a part. It is a matter of common knowledge that rats and mice are rarely found living together and on amicable terms, the reason being that rats are apt to make a meal off any young mice they may come across. It has been observed that after a store or an area has been cleared of rats, mice multiply rapidly. They do not migrate or roam about to anything like the same extent as rats do, consequently plague diffuses slowly among them, and in this way the infection may be unobtrusively kept going.

VIII.—Measures taken for Dealing with Outbreaks.

I may now review the measures which have been taken for combating the disease, passing very briefly over such as have not an important bearing on the aspect of the subject dealt with in this paper.

The administration of all matters relating to plague has, up to the present, been carried out by the Government, with the Medical Officer of Health for the Colony as Director of Plague Administration. This arrangement has many advantages, but it also has certain disadvantages, chief of which is the difficulty of securing and retaining the active co-operation of Local Health Authorities. This disadvantage has been partly, but by no means fully, removed by the formation of Local Plague Boards, with advisory and consulting functions, at places where considerable outbreaks of the disease have taken place.

(1) *Measures for the Prompt Discovery of the Occurrence of Plague.*

(*a*) *Man.*—Plague is a notifiable disease under the Public Health Acts, and, as such, cases are required to be notified to the Local Authority by the medical practitioner, householder, or other person becoming aware of their occurrence. Notices describing the symptoms of the disease have been distributed broadcast. During periods of epidemic prevalence, employers of labour are, by circular,

requested to report any unaccountable absence from work on the part of their coloured, native, or Asiatic employees.

(b) *Animals.*—At the commencement of the invasion the public were, by notices and posters, requested to report the occurrence of any suspicious sickness or mortality amongst rats, mice or other animals liable to contract plague, coming to their notice. In August, 1903, notification of such occurrences was, by Regulation framed under the Public Health Amendment Act, made compulsory. Weekly reports as to the prevalence of rats and mice on railway premises, the numbers destroyed, and the occurrence of any suspicious sickness or mortality amongst them, are rendered by all station masters throughout the Colony. Travelling rat-catchers are also employed on the principal railway systems, their duties being not only to catch and destroy rodents on railway premises, but to promptly discover the occurrence of any suspicious disease amongst them.

Facilities for bacteriological diagnosis have been provided, and directions for forwarding specimens for examination published widely.

In this country of enormous distances and sparse European population, the difficulties in the way of the prompt discovery and notification of cases of the disease in man are considerable, yet the system has on the whole worked satisfactorily. Amongst the native, coloured and Asiatic sections of the population attempts at concealment have, however, been by no means uncommon. It is much more difficult to secure early information of the occurrence of the disease amongst rodents. Storemen and others, fearing the inconvenience entailed by disinfection, not infrequently fail to report. The system of railway rat-catchers and of reports by railway officials has on several occasions proved of the greatest value, leading to the discovery of outbreaks whilst infection was localised to the railway premises or their immediate vicinity.

(2) *Measures in Infected Centres.*

Cases in Man.—All cases have on discovery been immediately removed to a plague hospital or other suitable place, and isolated.

Contacts.—During the first year or so of the invasion all immediate contacts of cases were removed to an isolation camp, and kept there under surveillance for twelve days. During the Cape Town outbreak, 5,383 contacts were removed and isolated in this way, and of these only 64, or 1·19 per cent., developed plague. The administrative difficulties and expense entailed were very great,

and the system was very unpopular, especially amongst the educated classes. Gradually this system has been revised, and for a considerable time past only contacts who have been specially exposed to infection, as, for instance, persons who have been closely associated with or nursing pneumonic cases, or who cannot be relied upon to remain under surveillance, as in the case of lower class Asiatics or native "boys" who have come to the towns to work, are removed to the contact camps; all others are merely kept under daily surveillance for a period of twelve days from the date of last exposure to infection.

Inoculation.—During the Cape Town outbreak in 1901, and subsequently at Port Elizabeth, East London, and other infected centres, inoculation with Haffkine's plague prophylactic was extensively practised. In Cape Town practically the entire native population, numbering over 5,000, was inoculated simultaneously with their removal from Cape Town to the new location at Maitland. Only a few dropping cases occurred amongst them subsequently, but it is impossible to arrive at any conclusion as to how much, or how little, of this result should be credited to Haffkinine.

At Port Elizabeth an attempt was made on the first outbreak of plague there to secure the wholesale inoculation of the native and coloured population. A general strike resulted and the attempt had to be abandoned. Apart from the general inoculation carried out at Maitland, and an inoculation campaign in Kaffraria in the same year, during which some 5,000 natives voluntarily presented themselves for inoculation, the great majority of inoculations have been performed on coloured persons, natives or Asiatics leaving infected centres by rail, the production of an inoculation certificate being, by regulation under the Health Acts, made a condition precedent to the issue of a railway ticket to persons of this class. The measure has always been a very unpopular one, and has in several cases given rise to a degree of irritation amongst the class principally affected which has materially increased the difficulties of the general conduct of plague administration and operations. Furthermore, it is generally admitted that the measure of protection afforded by Haffkinine persists only for about six months at most, so that after this period inoculation should be repeated. In practice it has been found impossible, except in a very few instances, to secure re-inoculation. So far as has been practicable all persons on the plague staff and exposed to infection have been inoculated, the operation being repeated every five or six months. Up to the present, in round numbers, 33,000 persons have been inoculated

with Haffkinine since the first outbreak of plague in the Colony. In 67 cases of plague the fact of previous inoculation has been ascertained; of these 34 recovered and 33 died, equal to a case mortality rate of 49·25 per cent., as compared with the average case mortality rate for all cases of 50·9 per cent.

During the past year or two the measures for enforcing inoculation have been considerably relaxed and comparatively few persons have been inoculated. The medical inoculator, together with the lay inspector of the type who goes round and makes polite enquiries, has to a very large extent been replaced by the rat-catcher and the disinfecting ganger with his two or three labourers equipped with disinfectant, spade, pick, trowel and cement, tools for exploring under floors and taking off iron sheeting, and billy-can for rats killed or carcases found.

Regarding the protective value of inoculation with Haffkinine, no very definite opinion can be arrived at from experience in this Colony.

Yersin's anti-plague serum has been used on a considerable number of occasions as a prophylactic on persons who had recently been exposed to plague infection. The number of such cases is, however, too small to admit of any conclusions being drawn as to its protective value.

The Prevention of overcrowding and the Improvement or Evacuation of Insanitary Dwellings or Areas.—As a result of the plague invasion the native population of Cape Town, except the small proportion of educated or civilised natives, have been removed to a location situated outside the town and under Government control. Similar measures have been taken at Port Elizabeth. Extensive sanitary improvements of a permanent kind have been effected at both places; similar improvements have been prosecuted at the other infected centres. In the larger centres where outbreaks have occurred the effect of these improvements on the prevalence of filth diseases and on the general death-rate has been marked.

Rodents.—In the case of all the outbreaks determined efforts have been made to destroy or materially reduce the rat population. Traps, dogs, ferrets, poisons of various kinds and plaster of Paris have been tried, rewards of up to 6d. per rat destroyed have been offered, so-called expert rat-catchers have been specially imported, Danyz' virus has been given a very thorough trial, but it must be confessed that the results have in all cases been disappointing. Shortly after the commencement of the Cape Town epidemic cultures of Danyz' bacillus were procured from the Pasteur

Institute, but on arrival here they were found to be practically inert. A special laboratory was established under the charge of Dr. R. W. Dodgson, who succeeded in devising a method of raising the virulence of the organism to such a degree as to be uniformly fatal to inoculated rats. Pieces of bread which had been soaked in this virulent culture were distributed in very large quantities in Cape Town, and at Port Elizabeth, East London and Mossel Bay. A certain number of rats undoubtedly died from eating this infected bread, but nothing approaching an epizootic resulted, indeed, in certain stores in Cape Town where large quantities were regularly laid for a period of several months, the rats appeared to have acquired an immunity to the infection and to thrive and multiply on the supply of bread provided. There is one serious drawback to the use of this virus in a plague-infected locality—it is often impossible without careful bacteriological examination to say whether rodents found dead have died from it or from plague. If the carcases are only discovered when decomposition is advanced the differentiation may be impossible without lengthy investigation; thus the difficulties of following the course of and dealing with the plague epizootic are greatly increased. A similar objection applies to its use in places to which plague infection is liable to be at any time introduced. Attempts to destroy rats by means of Danyz' virus were discontinued in this Colony after July, 1902.

Experience has shown that even where efforts to reduce the rat population have been attended with considerable success, such reduction, in the absence of other measures, is likely to be of only temporary duration. Thus in the village of Knysna during the last three months of 1903, a total of 10,661 rats and 3,010 mice were accounted for, mostly through the agency of an army of local small boys working under the incentive of a reward of 6d. per rat and 3d. per mouse, and yet within a month from the latter date the rodent population of the locality was reported to be as numerous as ever. As our experience widened efforts came to be directed, not so much to the mere destruction of rats and mice as to measures of a permanent kind calculated to prevent the survival or development of a large rodent population, especially under conditions of close association with man. Chief of these measures are the alteration of existing buildings and the construction of new buildings—and more especially of stores, stables and similar structures where grain, forage or other articles of a kind likely to attract or harbour rats are kept—so as to prevent the harbourage of and be as far as possible inaccessible to rats, the storing of what may

be termed "rat edibles" in such a way as to prevent infestation by rats, the prevention of accumulations of rubbish or other materials liable to harbour rats, and the carrying out of proper scavenging with a view to preventing rats from gaining access to waste foodstuffs and garbage.

Disinfection.—During the early stages of the Cape Town epidemic, and largely no doubt as a result of Indian plague literature and experience, disinfecting operations were for the most part confined to the dwellings of persons affected: these were most thoroughly and minutely dealt with. When the significance of the discovery, in a large proportion of infected houses, of rats and mice sick from or dead of plague began to be recognised, operations were extended (except in cases where there was no reason to suspect rodent infection), to the adjoining premises, and later on to the entire blocks of buildings in which the case occurred, the conduct of the operations being guided in the main by the occurrence of human cases. As the importance of the part played by the rat in the spread of the disease became increasingly apparent, the system of disinfection—apart from the disinfection of residences of patients—came to be based to an increasing extent, and ultimately almost entirely, on the progress and course of the rodent infection, the object aimed at being to promptly deal with any extension of this infection to a particular area, and so prevent the occurrence of cases in man. Since then the conduct of all disinfecting operations has been based on these principles. The chief considerations kept in view in carrying out the disinfection of any particular locality are the number and distribution of the rodent population, the amount and virulence of the plague infection amongst them, the routes by which this infection has reached and is spreading from the area, the most expeditious and effective means of eradicating it and of preventing its further spread, of preventing the infection of persons residing or working in the locality and of destroying its rodent population. The rat-catchers devote as much or even more attention to the discovery of disease amongst the rodent population as to the destruction of rats; they are, so to speak, the scouts of the disinfecting staff. Premises or blocks of premises in which the amount of infection is greatest, or in which there is the greatest risk of the occurrence of human cases, or of further spread, are dealt with first, and from these centres the work is extended in an ever widening zone as far as may be considered necessary to completely eradicate the infection. Every endeavour is made to confine and destroy the rodent population in each set or block of buildings, and so prevent their migration.

The disadvantages of this system of picking out and dealing with infected blocks or circumscribed areas in a town are, firstly, that even when extensive operations are carried out around known foci, one can never be quite certain that the whole of the infected area has been dealt with. If infection remains—perhaps in burrows or rat-runs whose occupants have previously succumbed to plague—in a month or two the rodents again infest the area and the infection is rekindled. In the second place, notwithstanding every precaution, including, where practicable, the use of rat-proof fencing, wire netting and similar devices, it is in many cases impossible to prevent rats—some of whom would usually be infected—from migrating and dispersing as a result of the disinfecting operations, and thus spreading the infection over a still wider area. This objection can only be removed in one way, viz., by carrying out the systematic disinfection of the entire infected town or area, beginning at one end and going right through to the other, devoting special attention to places where active infection is discovered or known to exist, but also dealing with every place where there is any risk of the persistence of infection. With a view to testing the efficacy and practicability of a measure of this kind, a scheme of systematic disinfection on these lines was carried out in Graaff-Reinet from April to May, 1903. The results were entirely satisfactory, the expense was not excessive, and plague infection was completely eradicated. During the three months following another and considerably larger infected centre—King William's Town—was dealt with in the same way and with equally satisfactory results. After the completion of the scheme and the subsequent period of three months' close inspection, no plague infection in man or animals was discovered in King William's Town until after the re-introduction of the disease from East London in March, 1905.

Subsequently, in September, 1903, a similar scheme was devised and carried out in the still larger centre of East London. Here the difficulties—apart from the greater size of the town—were much greater than any previously met with. An extensive fire had occurred some months previously and had destroyed a number of large stores, and as a result of this and of the block in goods traffic which, after the end of the war, followed on the disposal of the surplus military stores, the stores in East London were densely packed with goods. The Harbour Board Area, a strip of ground about a mile in length along the east bank of the Buffalo River—which had been badly plague-rat-infested from the commencement

of the outbreak—consists of "made-up" ground with huge boulders and spaces intervening below; these were swarming with rats, many of whom were plague-infected, and rats dead of plague were constantly being found. There were other considerable areas of "made-up" ground in the town, upon which wood-and-iron store buildings had been erected; these were also badly plague-rat-infested. In King William's Town store-owners and the mercantile community generally had, with very few exceptions, actively and cordially co-operated with the Plague Staff in carrying out the work of disinfection, but in East London such co-operation and assistance was in many instances not forthcoming and, indeed, a good deal of obstruction was met with. The systematic cleansing work was begun on September 26th, 1903, and completed in the beginning of April, 1904. Unfortunately, the Disinfecting Officer, Mr. W. C. Winshaw, who had been in immediate charge of the carrying out of the similar schemes at Graaff-Reinet and King William's Town, himself contracted plague shortly before the completion of the scheme, which had, therefore, to be completed by another Officer. In Mr. Winshaw's case infection was in all probability conveyed by the dusty atmosphere of a plague-rodent-infested store. The attack terminated in recovery.

From the completion of these operations no further discoveries of plague-infected rodents were made in East London until the end of July following. On this latter date, however, a mortality amongst rats was discovered to be occurring in the neighbourhood of the Municipal rubbish-depositing site and in a store area adjoining, and on investigation it was found that the infection had already extended over a considerable area. Every effort was made to confine it but without success, and as a result the rodent population of the town was once again re-infected; concurrently with this recrudescence a number of cases occurred in man.

In November, 1904, a systematic cleansing scheme for Port Elizabeth was devised and entered upon, the work being carried out under the immediate direction of Dr. D. C. Rees, Government Plague Officer, and Mr. Winshaw. The difficulties were much greater than any of those previously experienced, owing mainly to the large extent of the town, the enormous number of large stores, and the prolonged infection. The scheme was completed in April last. Since then plague-infected rodents have continued to be found at intervals, and seven cases in man have occurred. These recrudescences would, however, appear to be of a purely local character, and there is still a reasonable hope of the complete

eradication of the infection during the course of the next few months.

In addition to the places above mentioned, the systematic cleansing of two small centres, viz., Kei Road and Lady Grey Bridge, have been carried out, and in both instances with complete success. There can be no question that this system is most effective for small centres; for large centres success in completely eradicating the infection is by no means certain, and the cost is heavy.

Time does not permit of my entering into any detail regarding this system of cleansing, but its salient features may be summarised as follows:—

(1) A careful inspection of the area to be dealt with is first made, and what may be termed a general "plan of campaign" decided on. It is known that the rats are apt to retreat before the advancing operations; where practicable these are arranged so as to constitute a series of "drives," each drive converging on some place adapted for hemming in and destroying them.

(2) Estimates of disinfecting materials, equipment, and all articles likely to be required are drawn up and supplies arranged for, so as to obviate any delay during the progress of the work.

(3) A disinfecting staff, sufficient to carry through the scheme expeditiously, is organised, preference being given to foremen, gangers, and labourers who have previous experience of similar work. Arrangements are also made for the prompt carrying out of bacteriological examinations. Work is not commenced until all arrangements are complete and everything in readiness.

(4) In carrying out the work the lines already sketched are closely followed. All rat burrows, under-floor spaces, double partitions, and enclosed spaces in walls and buildings—every place that is likely to harbour rats, or to have been contaminated by infected rodents—is explored and disinfected. Expedition is a great desideratum—the aim is to carry out the work so as to entail the least possible expenditure of time and labour consistent with efficiency. Every effort is made to occasion as little inconvenience as possible to owners and occupiers of property and to avoid damage to property or goods; nothing is destroyed. The *bonâ fide* claims for compensation arising out of the general cleansing schemes at East London and Port Elizabeth have been quite trifling. Occupiers of stores and business premises are expected to assist where large quantities of goods have to be moved or other extensive work of a like kind carried out.

Concurrently with the disinfection of grain and produce stores and other buildings of a similar kind, the contents are re-stacked on dunnage twelve to eighteen inches above the floor level, and with a passage all round. It has been found that rats do not infest goods so stacked, especially if one or two cats be kept on the premises; they have to "break cover" every time they leave to get water—which they probably require once every twenty-four hours or thereabouts. This arrangement of the goods also greatly facilitates subsequent inspections. Permanent improvements in the direction of making the stores or buildings inaccessible to rats are at the same time carried out. Minor alterations of this nature are usually effected by the Plague Staff; more extensive alterations are required to be carried out by the owner or occupier.

The disinfectant principally used is an acid solution of perchloride of mercury of a strength of 1—750 or 1—1,000. The ideal disinfectant for the purpose should destroy all infection with which it comes in contact, and also prevent the return of rats to the premises until sufficient time has elapsed to allow of the devitalisation by desiccation of any infection which may have escaped destruction, With the exception of mercurial solutions, none of the commonly-used disinfecting solutions appeared to have any effect in this latter direction. In a series of experiments carried out by Mr. Winshaw, of the Plague Staff, and Dr. Coutts, of the Bacteriological Institute, Grahamstown, where rats were kept in cages floored with layers of soil saturated with various disinfectants, the rats in the cages the floors of which had been treated with phenol disinfecting solutions remained healthy, whilst none survived for a longer period than fourteen days on the mercurialised floors. No distinct pathological lesion was discovered in the latter, but a trace of mercury was discovered in their bodies on chemical analysis. In practice, rats rarely return to burrows or under-floor spaces treated with perchloride of mercury solution until several weeks after disinfection. Unfortunately, however, the use of this solution has very little effect in preventing the return of rodents to spaces and runs in woodwork, under roofs and so forth. Chloride of lime has been used for this purpose, but its action is evanescent. A disinfectant or other substance which would effectively prevent for a period of two or three months the return of rats to buildings and premises treated with it, would be of inestimable value in connection with plague disinfection.

(5) As the work of systematic disinfection of the area proceeds, some of the foremen or more intelligent gangers who have been

employed on the work, and who in consequence know all the nooks, crannies and rat haunts in their respective sections, are left behind to keep the area under surveillance with a view to the prompt detection of any return of rats or rekindling of infection. Experience, more especially at Port Elizabeth and East London, shows that isolated recrudescences of this kind are to be expected even when every care in the conduct of the disinfecting operations has been exercised, and unless they are effectively dealt with there is always grave danger of the re-infection of the entire area. As already mentioned, such an occurrence took place at East London; Port Elizabeth is at present in the stage of inspection after systematic cleansing, and isolated foci of persistent infection continue to be discovered at intervals. In most of these recrudescences the cause of the persistence of the infection can be ascertained. In several cases at Port Elizabeth it has resulted from rat burrows under concrete floors without foundations, which had escaped detection and disinfection. In a number of other cases it has been due to previously undiscovered rat-runs or enclosed spaces in walls or between buildings.

IX.—Prevention of Spread of Plague from Infected Centres.

(1) *Man.*—During the early stages of the invasion of the Colony a system of medical examination, and the issuing of medical certificates to all persons leaving infected centres by land, was carried out, measures being taken to prevent the departure of those not in possession of such certificates. The expenditure entailed was very considerable, and although every effort was made to minimise inconvenience to persons travelling, much public irritation resulted. Although the system in its complete form was in operation during the first three years or so of the invasion, only three cases of plague were discovered in persons desiring to leave; the measure probably had, however, a certain influence in preventing infected persons from attempting to escape from infected areas. As our knowledge of the modes of spread of the disease increased, and as it became evident that even where a case of the disease had been exported to a previously uninfected centre, there was little or no risk of any considerable extension, the system was gradually relaxed. During periods of epidemic prevalence of the disease arrangements are sometimes made for the medical examination of natives, coloured persons and Asiatics leaving by rail, largely in order to allay the

apprehensions of Local Authorities at the places of destination of passengers of this class. Passengers leaving infected ports are medically examined before departure, as provided for by the International Health Conventions.

(2) *Personal Baggage.*—Personal baggage was also at first similarly examined, and, in the case of natives, coloured persons and Asiatics, required to be disinfected before removal from plague-infected centres. This measure has for a considerable time past been discontinued, except under very special circumstances, or where required under the International Health Conventions.

(3) *By Merchandise and Rodents.*—Of immeasurably greater importance than either of the foregoing is the prevention of the spread of plague infection by the agency of merchandise and goods contaminated by infection or harbouring infected rodents or their carcases. The problem is a most difficult one, and up to the present no really effective solution of it has been evolved. With the enormous quantities of merchandise and goods leaving the larger ports by rail for places up-country, a thorough system of inspection cannot be enforced without causing serious inconvenience to the mercantile community, and, possibly, dislocation of trade. Sulphur fumigation by means of an apparatus designed on the lines of the Clayton Disinfector has been suggested. This might be practicable where the quantity to be dealt with is small—indeed, during the Mossel Bay outbreak in 1901 the fumigation of all goods likely to be contaminated with plague infection, or to harbour rats, was carried out before such goods were allowed to be sent out of the town—but in the case of places such as Cape Town, Port Elizabeth and East London, I cannot see at present how such a scheme could be carried into practical effect. The measures which have been found practicable are the careful surveillance of all stores and business premises from which goods likely to be contaminated with infection, or to harbour rats, are exported, and the inspection of all such goods before despatch. The history of the disease in the Colony shows that the measures taken have not in all cases been attended with success.

X.—Special Measures at Ports.

Before any vessel is granted *pratique*, certificates of the usual nature, regarding the occurrence of infectious diseases in man, must be signed by the master and also by the ship's surgeon, if there be one. Up to the time of the "Nevassa" incident, already referred to, no certificate was required regarding the existence of rats on

board or the occurrence of suspicious disease amongst them; port health officers, however, had instructions to make careful enquiries on this point, especially in the case of vessels which had recently visited plague-infected ports. Under the regulation already referred to, making compulsory the notification of any sickness or mortality amongst rats or other animals liable to contract plague occurring within the Colony or in its territorial waters, a certificate as to the state of infestation of the vessel by rodents, the finding of any dead or sick rodents, or other circumstance pointing to the occurrence of sickness or mortality amongst them, is now required to be signed by the master of every arriving vessel before *pratique* is granted. This certificate has been in use since September, 1903.

Rat-catching staffs are employed at the larger ports, and arriving vessels searched for evidence of infection amongst rats, or for goods damaged or contaminated by rats; in the case of vessels which have recently visited plague-infected ports, this search is, if possible, carried out before the vessel comes alongside the quay. The Clayton Sulphur Disinfecting Apparatus has been provided at the port of Cape Town, but, except in one instance, has so far been used only for disinfecting infected vessels. Experiments which have been carried out by Dr. G. W. Robertson, Bacteriologist to the Government Public Health Department, show that the apparatus provides an effective means of destroying insects, rodents and disease infections. The heavy cost of working and the effects of the sulphur fumes on certain articles of cargo—such as seeds, the germinating power of which is destroyed, flour, which does not "rise" satisfactorily after treatment with the gas, and dyed silks, which are apt to be discoloured—are serious drawbacks. For empty vessels, vessels in ballast, or vessels with cargo of a kind not liable to be damaged by the gas, the Clayton System of Disinfection would appear to be both convenient and effective.

A good deal of attention has been directed to the question of preventing the migration of rats to or from vessels. During the first two or three years of the invasion of the Colony circular shields or bell-shaped discs were affixed to all mooring chains or cables, whilst gangways and other communications with the shore were tarred daily, so as to keep a strip of tarred surface, at least two feet broad, at all times in a sticky condition. As the efficacy of these measures appeared somewhat doubtful, arrangements were made to test them experimentally. A large tank was procured, a piece of cable stretched across it and rat cages fixed to the tank at each end of the cable. It was found that the forms of shields in

use were quite ineffective for preventing the passage of rats. A strip of recently applied tar was found to be equally ineffective. A considerable amount of ingenuity has since been expended by the Officers of the Department in devising a means of effectively preventing this migration. Many forms of shield have been devised, but all have proved ineffective. The only device which has proved at all effective is a metal tube some eighteen inches long, smeared thickly with bird-lime and adapted for fixing over cables. Although when chased a certain proportion of the rats experimented with succeeded in safely crossing this obstruction, it has been found that when not so chased they are, if the bird-lime and rats be fairly dry, invariably either caught in the bird-lime or else they fall into the water more or less entangled with bird-lime and usually drown. Gangways can be similarly protected by laying across them bird-limed boards about eighteen inches broad. The great defect of this plan is that it is only effective when both the bird-lime and the rats are fairly dry; in the open during wet weather it would be ineffective. The ideal arrangement for preventing this migration should not only effectively prevent rats from traversing cables between vessels and the shore but should catch all rats making the attempt, so that they could be subsequently examined; it should also be cheap and of simple construction. Such an apparatus has yet to be devised.

XI.—Concluding Remarks.

Before suggesting any extended application of the results of experience of plague in this Colony it may be well to enquire how that experience compares with the history of the disease in other countries which have recently been invaded. On tracing the history of the present pandemic—which commenced at Canton in 1894—it will be seen that in a very large proportion of the sea-port towns which have become infected, there is clear evidence of the introduction of the disease either by infected rats or by forage, grain, sacking, or articles of a similar kind contaminated by infected rats; I know of no instance where any considerable outbreak of plague occurring at a sea-port has been definitely traced to infection introduced by persons suffering from the disease.

Regarding the mode of spread of the disease in coastal towns, the experience of Hong-Kong, Asuncion, Pisco, Callao, Sydney, Brisbane and Durban has been similar to that of the Cape Colonial Ports. In each of these outbreaks cases of the disease in man

have followed in the wake of a rodent epizootic. Up to the present India and South Africa are the only countries which, during the present pandemic, have had any considerable experience of the spread of the infection inland. In this Colony, with the exception of the Izeli outbreak—in which the disease remained for a considerable time undetected—in every instance where the disease has gained a footing in an inland centre the transmission has been due directly or indirectly to rodents. In India, on the other hand, human intercourse has all along been regarded as the principal mode of spread of the infection to fresh localities, the infection being conveyed from place to place by human cases—frequently of the "ambulant" type—the rodent population being, it is said, almost always infected secondarily. Furthermore, human intercourse has been regarded, both by the Indian Plague Commission, and by most, if not all, subsequent writers on plague in India, as by far the more frequent mode of transmission of the infection to man. The Indian Plague Commission's Report of 1901 attributes epidemic plague principally to direct contact with persons suffering from the disease, or with infected articles; it, however, states that rats take plague and that rats and man may be reciprocally infective, but that an epidemic sometimes precedes and sometimes follows an epizootic, and that sometimes each runs its course independent of the other. From what has already been said it will be seen that the history of the disease in South Africa is radically different from this; indeed, no parallel can be found in the history of the present pandemic. It seems incredible that so many competent observers of plague in India should have been mistaken either in their observations or deductions. It may be that the native population of India is exceptionally susceptible to plague, or that the strain of infection has greater powers of diffusion by human agency than it has in other countries; possibly both these causes may operate. In the history of the present pandemic of plague the experience of India is clearly exceptional, whereas that of all other invaded countries is analogous to experience here. It is therefore, I think, justifiable to urge that the lessons taught by plague in this Colony are of very general applicability. The history of the past few years has shown that at the present time no country is safe from invasion by plague. It would appear that in Europe human intercourse is still regarded as the principal mode of the spread and introduction of the disease in man—the great danger to be guarded against. The International Health Convention, drawn up at Paris in 1903, makes careful provision for the inspection of passengers

leaving or arriving from infected ports, and for the inter-State notification of the occurrence of human cases of the disease, but no such notification of plague in rodents is required to be made unless or until cases of the disease in man have also been discovered. No one who has had experience of the usual mode of spread of the infection can regard this omission otherwise than as a vital defect. Again, while the Convention provides for the quarantining of vessels with human cases on board, vessels with infected rats, but without cases in man, on board cannot under the Convention be so dealt with. Since August, 1902, every discovery of plague in rodents or other animals in this Colony has been included in the weekly plague bulletins issued by the Government, an example which New South Wales and Natal have since followed.

There would seem to be a fairly general feeling that a European town, administered on modern sanitary principles, has little to fear from plague, and that, even were the infection introduced, it could be speedily eradicated by the application of the general sanitary measures ordinarily taken for combating outbreaks of infectious disease. Judging by experience of the disease in South Africa, this is a dangerous fallacy. Poverty, overcrowding, want of sunlight, bad ventilation and their concomitants, undoubtedly have their effect in fostering plague, as they have, for instance, in the case of small-pox. An attempt to combat a plague outbreak without taking measures against rats would be comparable to attempting to eradicate small-pox without enforcing vaccination. Little or no danger need be apprehended from the occasional introduction of cases of the disease in man; the real danger is the risk of infection of the rodent population, and it is against this that coastal precautions should be principally directed. No doubt, in a well-built European town, a rodent epizootic could be combated much more effectively than is possible in towns such as those of this Colony, they could more easily be divided up into what may be termed "rat-tight compartments." Yet should plague once gain a thorough hold on the enormous rat population of, for instance, one of the larger ports of Great Britain, such as London, Liverpool or Glasgow, and were it to have the same power of diffusibility amongst rats and the same transmissibility from rats to man as have been observed here, the results might be very serious. It is sincerely to be hoped that the resources of modern sanitary science will succeed in averting such an eventuality.

THE OPERATIVE TREATMENT OF FRACTURES, INTRODUCING SOME ORIGINAL METHODS OF BONE-UNION BY SIMPLE MECHANICAL MEANS.

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In the year 1895, and again in 1897, Mr. Arbuthnot Lane delivered two characteristically original lectures, the one "Some Clinical Observations on the Principles Involved in the Surgery of Fractures," the other "The Treatment of Simple Fractures by Operation." These appeared at the time in the *Clinical Journal*, and were subsequently issued in book form, with many other striking articles on various unexploited subjects by the same author, and which, though unconventional and somewhat heretical, are all of absorbing interest.

In the two lectures dealing with the surgery of fractures to which I refer, the author emphasises the already prominent fact, that during the recent rapid strides in the general advance of surgery, that branch of it dealing with the treatment of fractures has persistently fallen behind; indeed, has, in his opinion, retrograded. He dwells on the entirely unsatisfactory results obtained in a large proportion of cases treated by the methods at present in vogue, "whose only claim to perpetuation is their extreme antiquity." Especially is this so in injuries near to, or actually involving, joints where the entire mechanics of the limb are altered, and where, unless the patient be young, growing, and adaptive, very serious impairment, loss of function and consequently of wage-earning capacity result, through mal-position of fragments whose axes are at variance, and their extremities not approximate. This is followed by traumatic and arthritic changes in the neighbouring violated joints, varying according to the age of the patient, and always more pronounced in the lower extremities, which must of necessity be constantly influenced by the body weight. Such active adaptive changes in the joints of the young, and the passive arthritic changes in those of middle and advanced age, are in the former sometimes, and in the latter always, associated with varying loss of control, physical incapacity, pain, wasting, œdema, &c., which make the sufferer's lot a hard one, and places his monetary prospects on a most uncertain footing.

These facts, and many others of a like nature, are displayed most forcibly and with mechanical detail. The final conclusion is that every fracture, whether simple or compound, whose fragments cannot be conclusively and accurately approximated by the usual non-operative methods, should be cut down upon, exposed, and united by mechanical device. To use the author's own vehement protest: "If we wish to consider ourselves scientific surgeons we must be guided in our practice by well-recognised mechanical principles, and not follow blindly a creed which can be proved by naked-eye evidence to be false, merely because we are imbued with the belief that it affords us such results as, in the past, we were satisfied to call good—meaning to imply not absolutely bad. Perfection, or the nearest approach to it, must be our goal, we must accept no compromise." And again, "It seems to me quite time that surgeons should throw off their prejudices, and let their actions be guided by facts and reason instead of by tradition and superstition."

These are indeed most rational conclusions; why are they not yet universally adopted? No surgeon, since the introduction of the operation by Lord Lister many years ago, hesitates for a moment to wire a fractured patella, yet the after-results of such an injury, dealt with by splints alone, are, Mr. Lane asserts, not so deplorable as those following a like treatment of Potts' fracture in the adult, of which Cheyne and Burghard, perhaps imbued with an optimistic belief in the results of conservative treatment, and overlooking an unpleasant reality, say, "In the case of Potts' fracture the trouble in the treatment is not so much in the reduction of the deformity and the promotion of coaptation, as in restoring to the patient a useful functional limb."

Again, this operation on the knee-joint is the most dangerous in surgery. Why then hesitate to explore a simple misplaced fracture, where the risks are far less, and the gain as great? Simply because of the "unreasoning, imitative, capacity of the human animal, which we inherit from our Simian ancestors." Some surgeons still, with a traditional dread, loudly decry the conversion of a simple into a so-called compound fracture, quite overlooking the vast difference in the two cases, a distinction between an aseptic intentional and a septic accidental wound. Times have changed since every compound fracture demanded immediate amputation, and every operation fomentations.

Before proceeding to the actual methods of bone-juncture, let us briefly consider what are the factors which militate against the

surgeon in his endeavour to reduce a fracture to its natural relation, or, in other words, what forces maintain sundered fragments in false positions. Primarily, there is the force of impact furthered by the unresisted action of gravity in a disabled limb, which, unless there is actual impaction, produces an initial displacement varying proportionately with the nature of the violence, whether direct, indirect or muscular, causing overlapping of fragments, inclusion of tissues, and frequently destruction of surrounding structures. This original displacement is maintained and even aggravated by an immediate spasmodic contraction of the muscles acting on the bone, which is, however, a transitory condition of little import, lasting only a few hours, and readily relaxed under the influence of an anæsthetic, or tired out by continued extension. There is, I am convinced, however, another far more important muscular action, which one might call, for purposes of distinction, the "secondary contraction or adaptation." This begins to exert itself within twenty-four hours, if the fragments remain displaced, and consists in the adaptation of muscular attachments to their altered and shortened bony supports. All muscle being elastic and constantly on the stretch when its opposing resistance is relaxed or completely overcome, tends at once to contract and shorten in length, soon permanently adjusting itself to altered conditions quite independent of any inflammatory exudation or contusion. This secondary contraction accounts, I feel sure, for the difficulty so often met with, even when the break has been exposed through an incision, in reducing fragments of several days' standing, even though there has been little or no hæmorrhage, exudation or actual damage to the parts (Case 1, Plate II).

This muscular factor suggested to me the possibility of securing firm and accurate end-to-end union by means of a single medullary support penetrating both fragments, relying on such a stay and on the approximating force so exerted to maintain the re-established continuity. In violent injury, where there has been actual laceration, the chief factor, as Mr. Lane points out, is undoubtedly the hæmorrhage poured from torn vessels and vascular bone into a closed elastic sack of tissues surrounding the bone and clothing the limb. Here the outward pressure exerted by the pent-up fluid generates a force which causes the severed fragments to overlap still more. This condition frequently imposes an insurmountable obstacle to complete reduction, and is only aggravated by prolonged and futile manipulation. If such be the case, a successful result can only be obtained by operation. (In compound fractures the

blood extravasated escapes freely, and this difficulty of reduction frequently does not exist.) Eventually, if left to Nature, inflammatory exudation and cell-infiltration ensues, the escaped blood coagulates around the fractured ends, fixing them firmly and forming a medium for the diffusion of lime salts, and the ultimate formation of callus, which is thus deposited in quantity directly proportionate to the severity of the injury, the amount of displacement, and the degree of mobility permitted. This point is emphasised by Mr. Lane, who says "The presence of callus indicates imperfect apposition, or a want of complete fixation, both evidences of unsatisfactory surgery. It is very useful in the savage and in the lower animals, but is a disadvantage in members of a civilised community, since it can only exist with unskilled work. Therefore, as far as we are concerned, callus is a thing of the past in the large majority of simple fractures treated scientifically."

It is this conspicuous absence of callus "in the majority of fractures treated scientifically" that, next to the absolute restoration of the normal bone, constitutes, to my mind, the greatest advantage in this operative procedure, and ensures the most complete and perfect results. Callus undoubtedly forms a natural and admirable splint in cases that are left entirely to Nature's cure; and when the displacement is virtually *nil*, or where restoration has been accurately accomplished and the damaged limb immobilised, no operation is necessary, nor indeed is justifiable; the small amount thrown out is then quite sufficient for the demands of security and forms a strong cement, the surplus of which is rapidly absorbed, leaving only a slight or no deformity. In other instances, however, where the displacement is not overcome, where deformity persists and mal-union occurs, the enormous quantity of callus formed round the fracture and necessary for its support takes years to absorb, and never completely, since its presence as new bone is essential to the future strength of the shaft. This surplus is then a grave danger to the patient's comfort and usefulness; not only does it increase existing deformity and further damage the mechanism of the limb, but gradually, as it hardens and contracts to bony consistency, it ensnares surrounding vital structures, hampering the movement of muscles and tendons, perhaps encroaching on the limits of joints, occluding vessels in their continuity, including and comprising nerves, and thus produces consequent limitation of use, chronic œdema, mal-nutrition, neuralgia, and pain on pressure and exercise; in fact, all the changes attributed by Mr. Lane to violation of bony axes and

articular surfaces, but which I am convinced are as largely due to the actual involvement of the soft structures themselves by this new growth. Under such conditions the limb is rendered completely useless, and will remain so indefinitely. During the last three months I have seen two almost identical cases which exemplify this point, both old-standing oblique fractures of the tibia near its centre, caused by direct violence. In each bony union had occurred, with considerable misplacement and overlapping of fragments. There was considerable deformity, slight shortening and wide-spread deposit of new bone, giving rise to all the symptoms just described. The limbs were painful, deformed and useless, and their owners, otherwise healthy men, had, of necessity, to be invalided from the service.

We have now considered the difficulties met with in reduction, let us briefly review the ordinary routine of a surgeon in dealing with a simple fracture, say of one of the long bones. In the first place he examines the limb, elicits crepitus and one or more of the other classical signs of the lesion, judges its variety and estimates the amount and direction of the displacement as accurately as is possible on mere manipulation through, possibly, tense and swollen coverings. The limb is then supported temporarily and the patient sooner or later introduced to the dark room and subjected to that more piercing surgical eye, the X-ray, which so frequently reveals a vast and unsuspected displacement. To obtain reliable information by this means the shadow must be cast in several directions, a single aspect being often quite misleading, and a lateral view frequently discounting the erroneous impression gained from one taken antero-posteriorly, or *vice versâ*. An anæsthetic, which is essential to accomplishing satisfactory reduction, should, where possible, be administered while the patient remains prone on the canvas-covered radiographic couch, the rays being cast from below and falling on the silenium screen, which should, from time to time, be held over the injury by the operator, who can thus ascertain his progress towards approximation, and so the fracture is brought into accurate position and there retained by means of a plaster case or wooden splints; these he will remove on the third or fourth day and start systematic massage and passive movement, which measure, carried to great extremes, to the exclusion of other treatment, by some French surgeons, will, I am sure, be recognised as the one marked advance in the surgery of fractures. It is an all-important factor in securing a useful limb after splinting, since it ensures proper joint movement and nutrition, prevents wasting

and adhesion, and promotes the absorption of callus. This saving clause is well demonstrated among lower animals, who, relying on new bone and constant movement, frequently gain quite efficient limbs, despite great deformity and mechanical disarrangement, after severe and utterly neglected fractures.

Now this is an ideal procedure, as far as it goes, and in cases where there has been little or no displacement, or where existing displacement has been successfully overcome, is all that is necessary, and will give admirable results; but there are very many instances where, owing to the nature and severity of the injury, it will be found quite impossible to restore the fracture, in spite of every assistance. More commonly in oblique fractures, fractures at the end of bones, or involving joints, separated fragments, compound, comminuted, and fractures of two parallel bones, also almost invariably in severe Potts' and Colles' fractures, and, of course, in broken patellæ, this simple treatment is absolutely inefficient, and, if persisted in, mal-union, with all its consequent disablement, must result. These then are the cases which, judged from a modern rational and scientific standpoint, demand operative interference. We have, with the aid of recent invention, reduced this branch of scientific surgery almost to a simple carpentering art; we have not only felt, but actually seen the support broken, and its fragments irrevocably displaced; we know cohesion to be essential, and are convinced that the unaided efforts of Nature towards this end, acting on such a complex and artificial machine as man, must prove disastrous. It remains then to decide what is the simplest means of securing union through an open wound.

Of the methods at present in vogue, the original, and still the most universal, is the junction of fractured ends by means of silver wire, or other less suitable plastic material, piercing the bone above and below the site of injury, or encircling it. More recently, Mr. Lane has introduced the ordinary carpenter's screw, and a slight modification of it designed by him. This is especially useful in separated promontories, and in very oblique or spiral fractures, the old-fashioned ivory peg having proved quite inadequate in these as in most other cases. The danger of the screw, however, is its liability to comminute the bone if carelessly applied.

The use of staples with serrated terminal spikes, introduced by Dr. A. Jacoel, is also an effective method of securing breaks in porous material, such as the patella and the extremities of long bones.

Now, the wiring of fractures, in spite of its general adoption,

is a proceeding fraught with great difficulties. I was at one time Mr. Lane's, and later Mr. Symonds', house-surgeon, and when assisting at a large number of such operations, I was struck by the many obstacles, checks, and minor disasters which may be met with, even under such master hands. Difficulties in passing the wire through the aperture in the second fragment, owing to the depth of the wound preventing its kinking, and getting it taut, and in twisting and hammering down the cut ends without snapping it—an accident which not unfrequently occurs—necessitating a fresh start and throwing a great strain on the fortitude of the operator. With these facts before me I have endeavoured to introduce some fresh methods of bone suture, which I hope may add to the simplicity of this operation and place it in its most recent and scientific light within the range of general surgeons like ourselves, who, in the Army especially, meet with such a large number of broken bones amongst soldiers, whose professional capacity and usefulness to the State depend entirely on physical soundness of limb.

These methods, which I must apologise for bringing to notice in their immaturity, involve the use of simple contrivances, and obviate the necessity for drilling bone and using wire, which demand much time and skill, and involve many risks. The contrivances are two:—

(1) The medullary spike.

(2) The bone fracture clamp.

They depend for their effect in the one case, on the support of the medullary cancellous tissue alone, and in the other, on the sole support of the compact bone. They may be employed singly or in conjunction (fig. 1 and Plate I.), and will be described separately and in detail.

The medullary spike consists of a double-pointed steel spike, divided by a raised flange into two unequal lengths, each from a quarter to two inches, and varying according to the necessity of the case, alterations being made if necessary during the operation, by means of a file or cutters. I have been using the ordinary carpenter's brad-awl heads, which answer the purpose admirably, and can be bought at any hardware shop at the small cost of two a penny. These may be filed down at the rough end, cut to the required size, and electro-plated, if desired, before use. The variety employed in conjunction with the clamp is essentially the same, but perforated to admit the passage of the tension screw, as I shall describe later (fig. 1 B).

The fracture clamp is a simple instrument consisting of two toothed jaws, each formed by the junction of small parallel steel rods, armed at their extremities with sharp spikes, and joined centrally by a free pivot, so allowing their close adaptation to any inequality of surface or variation of position which may be considered advisable.

The jaws grasp the bone on either side of the fracture, and are placed, one superficially, the other deeply. They are joined by a tension-screw of fine steel, which pierces the pivots and passes directly through the line of fracture, to the obliquity of which it accommodates itself accurately. The tension wire, some three or four inches long, is finely threaded and provided with a minute nut, which can be screwed down, thus clamping the jaws firmly home to any required position, after which any surplus is filed off and discarded (fig. 1, c and Plate I., c).

Described in detail, the jaws, one superficial the other deep, consist of two parallel steel rods $\frac{3}{4}$ to 1 inch, by $\frac{1}{6}$ by $\frac{1}{6}$ inch, provided with sharp terminal spikes $\frac{1}{8}$ to $\frac{3}{16}$ inch long, turned downwards and inwards at an angle of from 75 to 80 degrees. They are hammered out and perforated centrally, and are connected together by means of a pivot, riveted or screwed into position, and so allowing of adaptable movement in either rod. The pivots vary slightly in each jaw. Both are a $\frac{1}{4}$ to $\frac{1}{2}$ inch in length and of circular section steel, $\frac{1}{6}$ inch in diameter; they diminish at their extremities, which are received into the corresponding slots of the rods. Being themselves pierced centrally, the perforation in the deep pivot is threaded to hold the extremity of the tension screw, whilst that of the superficial one is smooth bored and admits its passage freely. This latter is also sunk with a small facet on its superficial surface, for the intimate reception of a tightening nut. The tension screw provided with this nut is made of tough steel wire $\frac{1}{16}$ inch in diameter, 3 to 4 inches in length, and threaded throughout. It is, as I have stated, screwed into the deep pivot and checks flush with its lower surface, whilst riding easily through the superficial one, which can thus be adjusted to any desired position through a fracture of almost any obliquity, and grasping the bone on either side of the break holds its ends firmly together and maintains both jaws closely adapted to their adjacent bone surfaces, when it has been secured *in situ* by means of the minute hexagonal nut $\frac{1}{10}$ inch in thickness and about $\frac{1}{8}$ inch in diameter, which being eventually tightened down and buried in the facet for its reception, the surplus wire is filed off and removed.

In the use of any of these mechanical devices one must be guided essentially by the needs of the case, the nature of the break, whether simple, compound or comminuted, its direction, transverse,

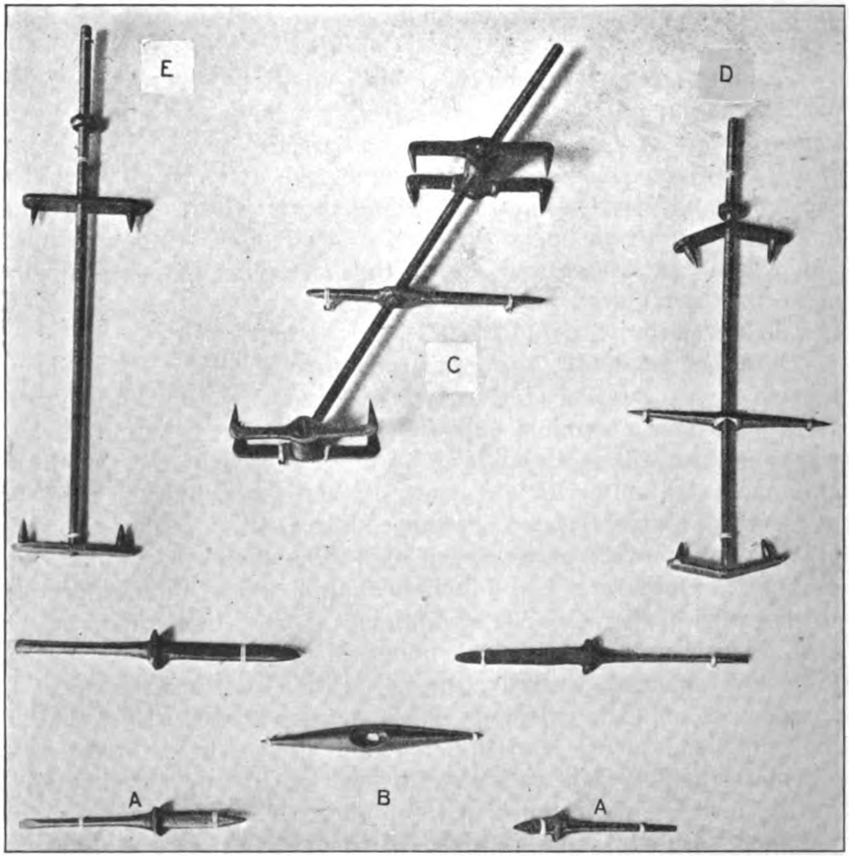


FIG. 1.—ILLUSTRATING "MEDULLARY SPIKES" AND "BONE FRACTURE CLAMPS."

A, "Medullary spikes" for use in their single capacity fined down to various sizes from the ordinary carpenter's brad-awl head; B, "Medullary spikes" for use in conjunction with the "bone fracture clamp," showing the oval perforation for admission of the tension screw, at any obliquity; C, "Bone fracture clamp" in conjunction with the "medullary spike" (oblique position); D, Modified "single" clamp with medullary spike *in situ*, as suggested for use in fractured patellæ; E, Modified "single" clamp.

oblique or spiral, its position, bone or bones in question, and the time of its occurrence, whether recent or remote. Having considered these points in detail, it only remains to select the obviously appro-

priate appliance. I have already referred to the use of screws and staples in oblique and spiral fractures respectively; wire can, of course, be almost invariably employed should necessity compel, in spite of its attendant difficulties. For greater simplicity, however, the medullary spike, used by itself, is admirably suited to most cases of transverse or moderately oblique fracture in shafts with a small central cavity. These include all the long bones (Plate I., E) with the exception of the femur, humerus and tibia (the centres of these shafts being so roomy and devoid of cancellous bone that under no condition would a medullary spike be of the slightest support), and also in all packed cancellous extremities and in one of parallel bones in which the sound bone acts as a natural splint to its broken companion. The efficacy of this method depends, in recent cases, on the "secondary muscular contraction" to which I have referred, and in those of longer standing to "inflammatory infiltration." These strong forces tend to approximate and overlap the fragments, and when once temporarily overcome, to keep them in close apposition, the inserted spike and roughened bone surfaces preventing any displacement.

I have used this device in its single capacity on several occasions, and find the result most encouraging (Cases 1 and 2, Plates II. and III.). Its application is simplicity itself and a great saving of time is effected. Having exposed and isolated the broken ends through a free incision, strong traction is applied, and they are forced freely out of the wound. The most fixed fragment, which is generally the larger or upper, is now held firmly in a lion forceps, while the longer point of the spike is pressed firmly into the medulla until the flange is reached. There is considerable resistance to its entry, especially in the smaller bones and extremities, and markedly so in the patella, which it may even be necessary to drill for its reception. The lesser or more movable fragment is next slowly everted and extended until the free point of the spike is opposite its centre, when the traction is relaxed and both pieces gradually and evenly pressed into their natural position, allowing the lesser spike to sink in as the ends approximate, which they do, firmly, forcibly and, if care has been taken, accurately into position. The greater the resistance offered at the time the firmer will be the after result, the central support and the interval friction insuring security. If movement of the fragments is limited and the lesser end found too long for insertion, a portion of it can be filed off without removing the spike from position. The advantages of such an operation are its simplicity and rapidity. There is no delay in boring holes, intro-

ducing, twisting and cutting wire, burying a screw, &c. No danger of splitting bone or breaking wire, and no subsequent interference or irritation of surrounding tissues or articular surfaces by a foreign body necessitating eventual removal.

The fracture clamps are suited to almost any break, if not too oblique or spiral in direction, and if in such oblique cases no more transverse lie can be utilised. It is introduced as follows: the ends having been exposed, cleared and brought into good position, strong extension is exerted, and the tension screw, with deep jaw attached, is slipped into the centre of the fracture. A small semicircle of compact bone having, if necessary for its closer lie, been filed or nibbled away from the edge of one fragment superficially and deeply, the jaw lying on the deep surface of the bone is secured in position, and its spikes pressed firmly in with a lion forceps. The superficial jaw is now slipped on to the protruding wire, and dealt with in like manner, the whole being eventually secured and tightened by means of the nut. When the ends are thus firmly united, the surplus screw is filed off and removed. These clamps may, when necessary for the sake of greater security, supplement the use of the medullary spike, which latter is then ovally perforated to admit the tension screw in a vertical or oblique direction, and requires no flange (fig. 1 B). When the spike has been buried in position, as already described, the tension screw with jaw attached is passed through its perforation from within, the extension relaxed, and both jaws secured *in situ*. This combination used with a small modified clamp, should be admirably suited to fractures of the patella (fig. 1, D and Plate I., D). The medullary spike being inserted in the centre of the bone and the jaws, which are single, adjusted laterally, so that the articular surface is in no way interfered with, the instrument can, if considered advisable, be subsequently removed through small lateral incisions made under the influence of a local cocaine anæsthetic. When expedient, the more complicated though securer clamp may be replaced by bone staples, which are of the simplest possible construction, and within easy reach of any surgeon who possesses some steel wire, a file, and a hammer, the ends being turned down, flattened and serrated at will. They are only effective, however, in soft extremities and perhaps in fractured patellæ, and are impracticable in the harder shafts of bone. Should sufficient support not be gained by staples alone, they may be supplemented by a spike or wire. In fixing them in position great care must be taken to steady the fragments by means of lion forceps. They should be hammered in with short

sharp blows distributed equally, and eventually driven home at the end of a steel punch.

There are two varieties of fracture which, though I have already referred to, require some further mention before bringing this paper to a close.

Firstly, the oblique and spiral, where no suitable lie can be obtained for spike or clamp. In these I am convinced Mr. Lane's method of screwing the fragments together is most reliable.

Secondly, comminuted fractures (and in such no fragments of bone should ever be discarded). Here I think it will generally be found advisable to secure the inlaid pieces by means of either longitudinal enclosing or circular binding wires, or both. In cases where two parallel bones of a limb are broken, it will generally be found sufficient to wire but one, and that the larger or more misplaced. This having been accomplished its fellow will usually regain a good position and require no further manipulation (Case 3, Plate IV.). So in Potts' fracture, when the inner malleolus has been separated, on joining the fibula alone the foot as a rule regains its natural position, carrying with it the severed bony fragment. Should sufficient support and reduction, however, not be gained by a single union, it becomes essential to effect a double one (Case 2, Plate III.).

Throughout this paper, from a point of view of mechanical treatment, I have included simple and compound fractures in the same category. No essential difference need exist, save that in the latter the adoption of a device that can be readily removed is necessary, hence the medullary spike is contra-indicated.

In conclusion, let me add that the only way of dealing with these cases satisfactorily and rightly is to make absolutely certain of the cleanliness of the means employed. Mr. Lane's rigid aseptic methods are of course ideal, but under less advantageous circumstances, and especially I imagine in foreign climates and with perhaps unskilled assistance, I am assured it is far safer to combine both aseptic and antiseptic routine.

Certain points of procedure are of paramount importance. Careful shaving and antiseptic compress of the entire limb at least twenty-four hours prior to operation (which of course in compound cases is impossible), strict exclusion of the rest of the body surface and the wearing of gloves by all who participate in the operation. The incision over the most accessible aspect of the bone must be free, avoiding all important structures, and the knife thus used immediately discarded before proceeding further. A thick layer

of cyanide gauze, slit to correspond with the length of the wound, is placed over it, and the edges sewn or pinned to those of the incision, which is then washed out with carbolic or weak mercuric lotion. The broken ends of the bones are then exposed, carefully freed and prised out of their bed, disturbing periosteum as little as possible. Any blood clot or lacerated muscle must now be removed and the entire wound washed out and packed deeply with antiseptic gauze, which diminishes the oozing, insures cleanliness, gives adequate support to the fragments in their exposed position, and protects surrounding tissues from injury during manipulation. The fracture is then dealt with as deemed advisable, the gauze plug removed, the wound again washed out with antiseptic and subsequently with saline lotion, the deep layers sutured, a drain inserted and the skin stitched with salmon gut, leaving several strands untied to be secured in twenty-four or forty-eight hours, when the tube is removed. This drainage is a most necessary and important precaution, and should, I feel sure, be adopted in every case, since it prevents dangerous collection of blood and lymph and undue pressure on stitches. Throughout the proceedings the hands of the operator must be, as far as possible, carefully excluded from the wound, and all assistance, sponging, &c., rendered by instruments only. Under such circumstances, the dangers of operation are reduced to an absolute minimum.

The most useful and comfortable support during convalescence is a plaster case, which should be applied when the patient is under the anæsthetic; whilst at the same time 20 to 40 cc. antistreptococcic serum may be usefully employed in compound cases—a routine practice in all operative dealings with bone and joints by some surgeons.

Should it be necessary, either from septic or irritative causes, to subsequently remove the mechanism employed, this can be done in the case of the clamp by exposing the superficial jaw through a small incision, removing it and the nut, and then loosening the deep jaw by pressing on the exposed end of the tension screw, passing a curved forceps round the bone and grasping the deep jaw, which is thus held firmly, while the tension wire is unscrewed from its pivot and the whole withdrawn piecemeal. Staples, screws and wires can of course be easily dealt with through small incisions; in the case, however, of the medullary spike it will only require removal in the unfortunate event of accidental infection, and should, therefore, never be used where the slightest uncertainty exists. Under such lamentable circumstances where there is a condition

of septic osteomyelitis, the rational proceeding will be, of course, as in any such case, to trephine the bone, when the spike can be readily removed and the parts drained freely.

Finally, the three following cases, which I shall give in some detail, together with illustrating radiographs, will, I trust, help to demonstrate points in the operative procedure and routine after treatment of the methods employed.

Case 1 (Plate II.).—Miss I. A., aged 12. Admitted October 2nd, 1905, into the Louise Margaret Hospital, Aldershot, suffering from Colles' fracture of the right wrist, caused by a fall on the out-stretched hand. The typical deformity existed, and on X-ray examination the radius was seen to be broken transversely, three-quarters of an inch above its lower epiphysis, the lower fragments being displaced, backwards outwards and upwards.

An anæsthetic was administered within an hour of the accident, but on manipulation it was found quite impossible to satisfactorily reduce or maintain the fragments in apposition. On considering the great mechanical interference with the function of the limb, which must certainly result if the deformity were permitted to persist, it was considered advisable to deal with the fracture through an open wound.

Operation.—Undertaken October 6th, four days after the accident. Chloroform was administered, and the lower end of the right radius exposed through a dorsal incision four inches long. There was no appreciable laceration or extravasation of blood to be seen, nor was there bony impaction; yet the greatest difficulty was experienced in reduction, owing I presume to "secondary muscular contraction," which on traction could be distinguished in the tense and shortened "ties" which maintained the deformity. This was overcome, however, with the aid of instruments and the fracture isolated, reduced, and secured by means of a "medullary spike," the long limb of which penetrated the shaft of the bone whilst the shorter engaged its separated extremity without interfering with its epiphysis. Throughout the operation, which lasted thirty minutes, the wound was frequently flushed with antiseptic and saline lotion. The skin and surrounding tissues carefully packed off with cyanide gauze, and manual contact avoided as far as possible. The deep structures having been united with silk sutures, the incision was closed and a drain inserted (twelve hours). The limb was immobilised in plaster, applied during the anæsthetic.

Patient made an uninterrupted and rapid recovery, the wound healing by primary union; the stitches were removed on the eighth

day, leaving a linear scar. She was discharged October 24th, twenty-two days after admission.

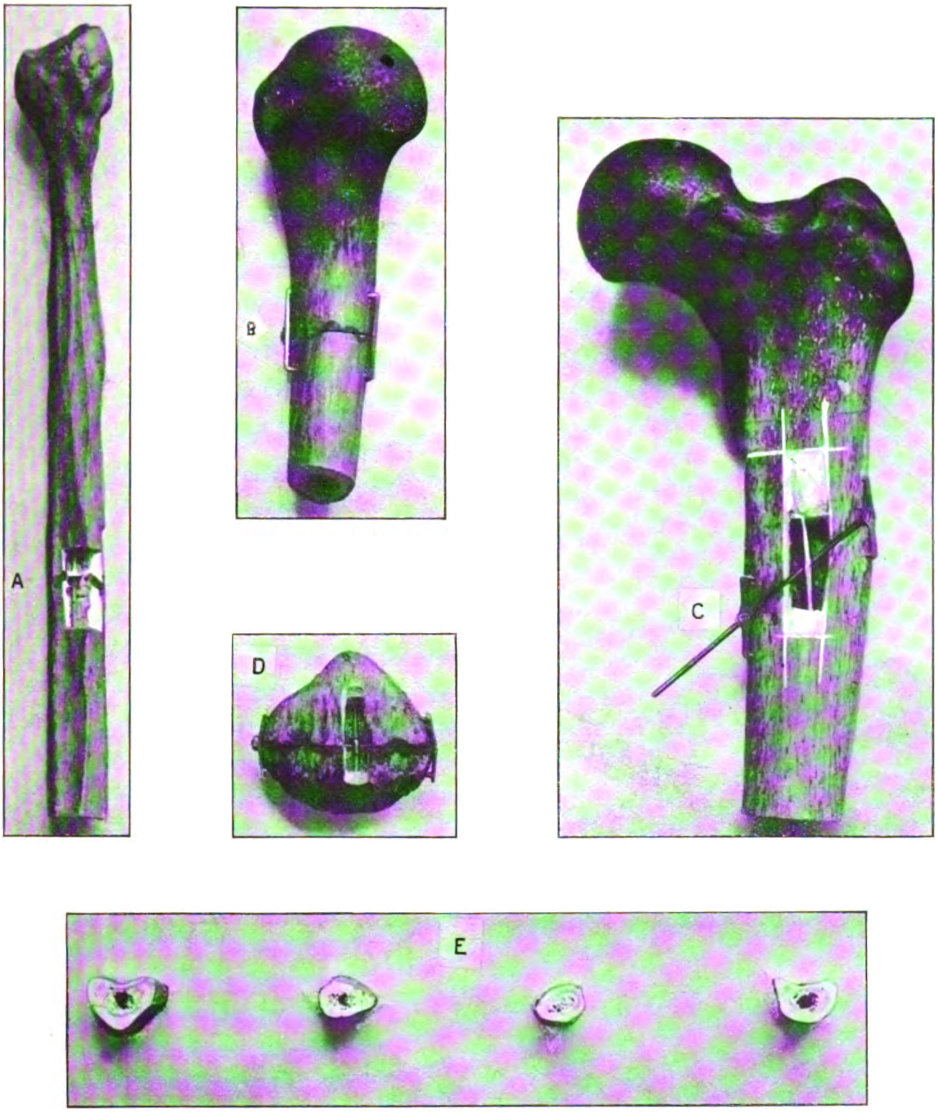
Passive movement and massage commenced on the fifth day and were continued for four weeks, when, all splints having been discarded, a system of regulated exercises was advised. Seen two months after the operation. Patient had complete restoration of function. There was accurate bony union (*vide* radiograph), and no sign of irritation or mal-nutrition provoked by the presence of a foreign body.

Case 2 (Plate III.).—Private H., A.S.C., admitted July 8th, 1905, into the Cambridge Hospital, Aldershot, having been thrown violently from a traction engine. Patient had sustained serious injuries to the left forearm, the radius and ulna being fractured transversely near the centres of their shafts, and the ulna also within one inch of its lower extremity. There was great deformity, laceration and extravasation of blood. On X-ray examination the fragments were seen to overlap to the extent of nearly one inch, producing considerable shortening. An anæsthetic was administered and the bones, being reduced as far as possible, were immobilised in splints and extension applied for a fortnight. It was found, however, impossible to maintain good position, and as much functional derangement seemed therefore imminent, it was decided to operate.

Operation.—Under an anæsthetic the shafts of both bones were exposed through two latero-dorsal incisions, each about six inches long. The broken ends having been freed and isolated, the fracture of the radial shaft was found to be slightly comminuted, and was therefore sutured by means of a silver wire, that in the centre of the ulna being secured with a "medullary spike." The deeper structures were next united, the tissues carefully irrigated, the incision closed, a drain inserted (twenty-four hours) and a plaster case adjusted to the limb during the anæsthetic. In ten days' time, primary union having resulted, the stitches were removed. Passive movement and massage commenced on the seventh day and were continued until patient's discharge on furlough September 19th, 1905, when he had regained considerable use of the limb, though its function was at the time still considerably impaired owing to the severity of the injury.

Case 3 (Plate IV.).—Private B., R.F.A. Patient, who is a champion wrestler in the Army, was admitted November 19, 1905, into the Cambridge Hospital, Aldershot, suffering from an oblique fracture of the tibia and a transverse fracture of the fibula in the

PLATE I.

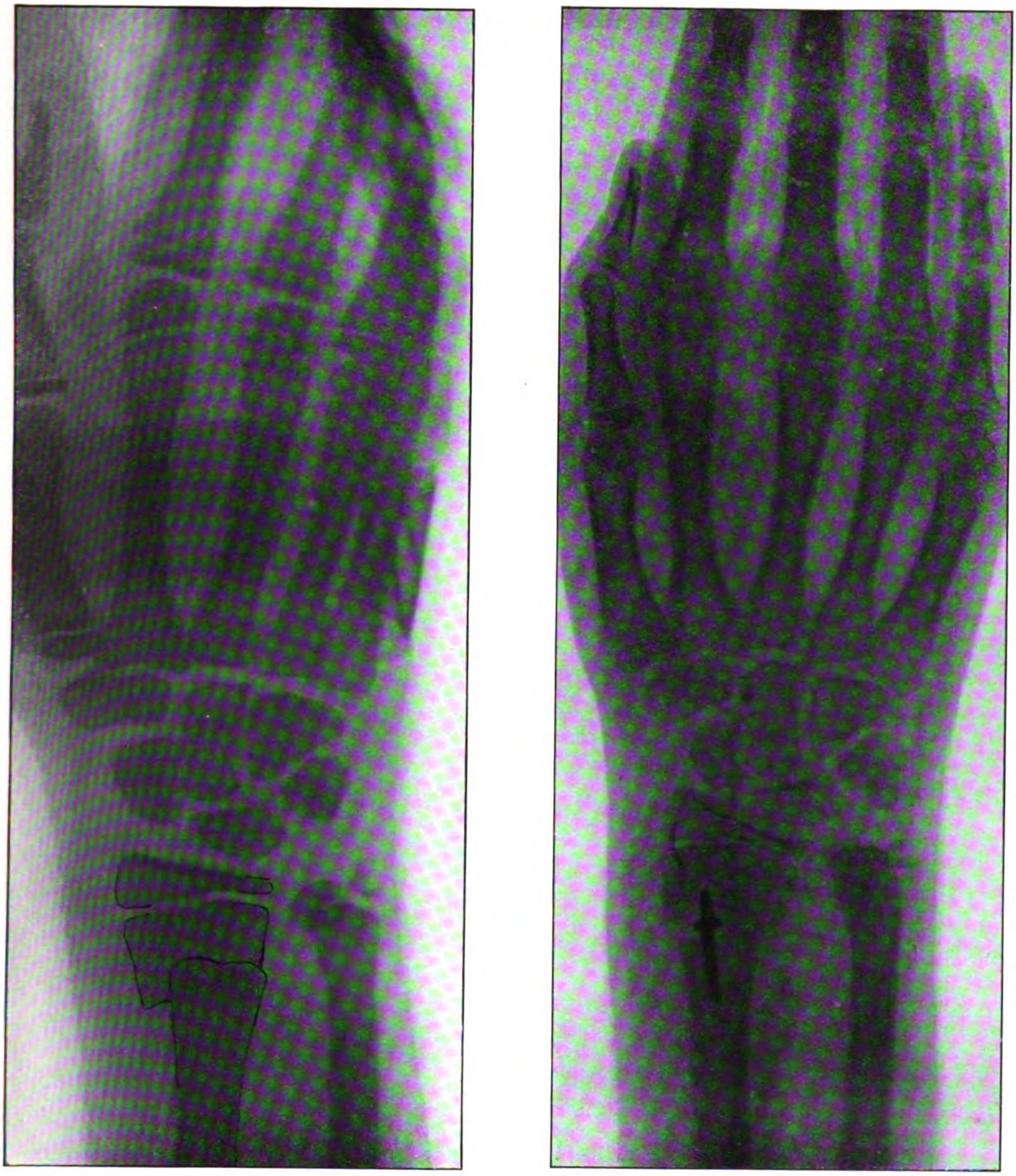


Illustrating "medullary spikes" and "bone fracture clamps," used separately and in conjunction. (From photographs of dry specimens.) (A) Fibula trephined to expose "medullary spike" *in situ*, holding a transverse fracture. (B) Transverse fracture of the humerus, held by a single "bone fracture clamp." (C) Femur trephined to expose "medullary spike" and "bone fracture clamp," holding an oblique fracture. (D) Patella trephined to expose "medullary spike" and modified "bone fracture clamp," holding a transverse fracture. (E) Transverse sections of long bones, near their centres (radius, ulna, fibula and clavicle), demonstrating their diminished, and closely packed, medullary cavities.

To illustrate paper by Lieutenant R. Grenville Anderson,

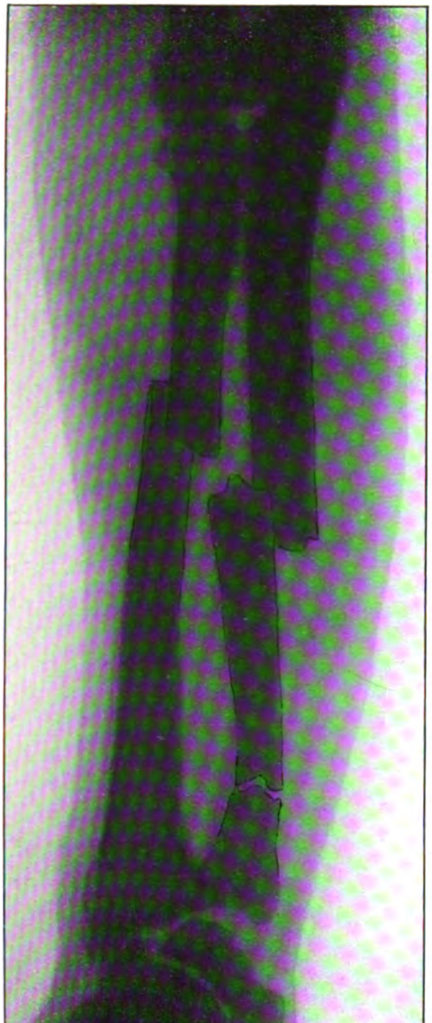
"The Operative Treatment of Fractures, introducing some Original Methods of Bone-union by Simple Mechanical Means."

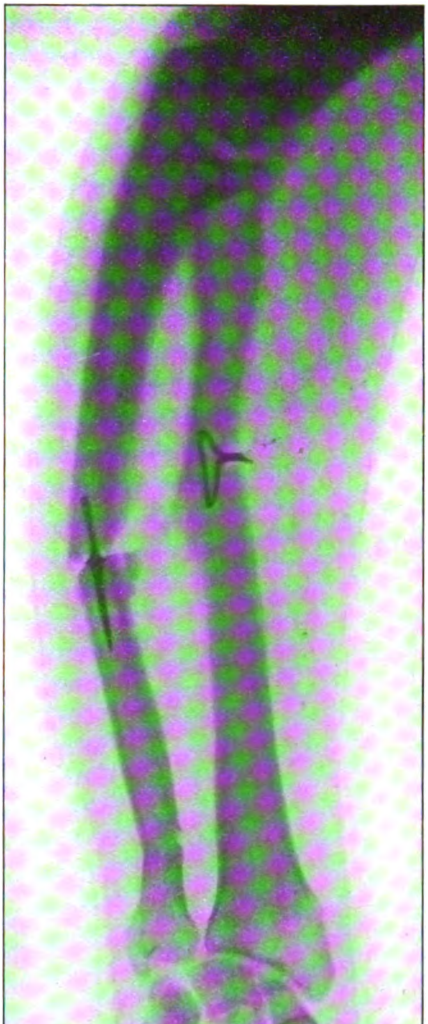
PLATE II.



Colles' fracture of the right wrist. Radiographed immediately before, and three weeks after, operation.

To illustrate paper by Lieutenant R. GRENVILLE ANDERSON,
"The Operative Treatment of Fractures, introducing some Original Methods of Bone-union by Simple Mechanical Means."

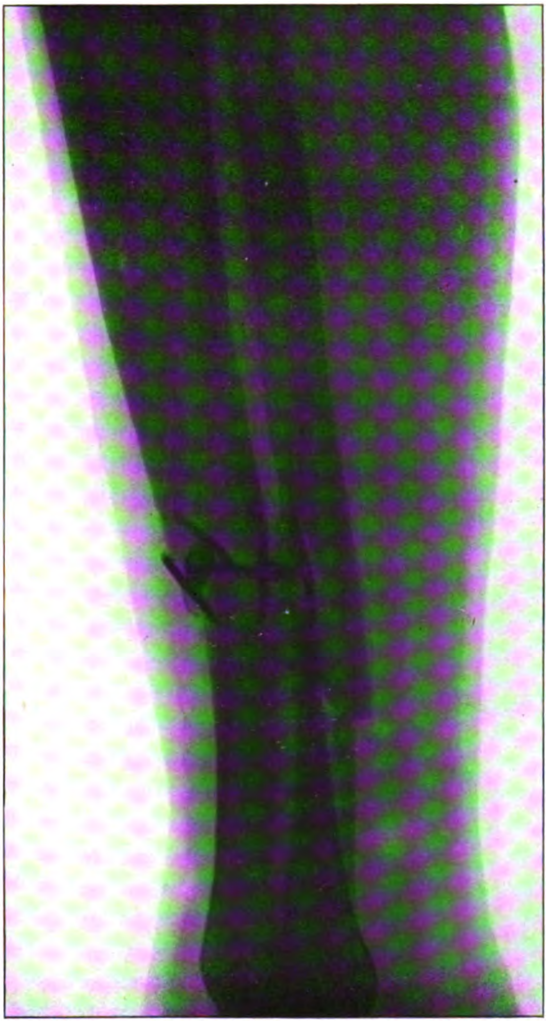




Transverse fracture of the left radius and ulna, near the centre of their shafts, and again at the lower extremity of the ulna. Radiographed before, and four weeks after, operation.

To illustrate paper by Lieutenant R. Grenville Anderson, "The Operative Treatment of Fractures, introducing some Original Methods of Bone-union by Simple Mechanical Means."

PLATE IV.



Oblique fracture of the tibia, and transverse fracture of the fibula in the lower third of the left leg. Radiographed four weeks after operation.

To illustrate paper by Lieutenant R. GRENVILLE ANDERSON,
"The Operative Treatment of Fractures, introducing some Original Methods of Bone-union by Simple Mechanical Means."

lower third of the left leg, caused by the direct violence of a kick at football. There was great laceration, extravasation, shortening and deformity; the lower fragments being displaced upwards, inwards and backwards, and the bony extremities overlapping to the extent of nearly two inches. The fracture was found incapable of reduction, even under an anæsthetic, and it was, therefore, decided to operate.

Operation.—Under chloroform, an anterior incision, six inches long, was made over the site of injury and the tibia exposed and isolated. Large masses of clot, intruding between the broken ends, having been removed, the fracture was reduced and secured firmly by means of a "bone fracture clamp" (as described in text). The fragments of the fibula falling into accurate apposition on reduction of the tibia (*vide* plate) required no mechanical interference. The wound being irrigated, sutured and drained (twenty-four hours), a plaster splint was applied during the anæsthetic. Primary union resulted and the stitches were removed in ten days.

Passive movement and massage, commenced on the eighth day, were persistently continued. When last seen, January, 1906, patient had secure, though as yet incomplete, bony union and was getting about on crutches.

I wish to express my thanks to Lieutenant-Colonel L. E. Anderson, Lieutenant-Colonel S. F. Freyer, C.M.G., and Lieutenant-Colonel S. Powell, R.A.M.C., for their valuable aid in many of these plastic operations on bone, and also acknowledge the help and initiative gained not only from Mr. Lane personally, but also from his published lectures, from which I have ventured to quote freely.

Photographs by Corporal Pell, R.A.M.C.

OCCUPATION FOR SOLDIERS IN HOSPITAL.

By Major E. C. FREEMAN.
Royal Army Medical Corps.

"The Army Hospitals' Industry" having proved a success at Colchester, it has been suggested that a short account of the work might possibly be interesting to readers of the Corps Journal, and might perhaps be a means of introducing the scheme in other hospitals.

Even in these days of advanced medicine and surgery, some cases spend a considerable time in the hospital wards, and they often find it very wearisome in spite of the hospital library and the time-honoured game of cribbage. Want of occupation is the parent of many evils, and Lord Methuen, who commands the Eastern District, being much struck by the work he had seen done by patients at Shorncliffe, asked Mrs. Wynne, wife of General Wynne, commanding at Colchester, to start last spring a Society for teaching convalescent soldiers various kinds of fancy work. Accordingly, with the approval of Surgeon-General Slaughter and the hearty co-operation of Lieutenant-Colonel S. C. B. Robinson, in charge of the Military Hospital, a meeting was held at Government House last June, a Committee formed under the presidency of Mrs. Wynne, and a Treasurer and Secretary appointed. A circular was drawn up setting forth the intentions of the Society, and an appeal made for funds, which was liberally responded to by the General Officers and the Regimental Institutes.

The kind of work suitable for the purpose was discussed:—Chip carving and repoussé metal work were too noisy for a hospital, wood carving too expensive and took too long to learn, so it narrowed down to rug-making, net-making, knitting and basket-making.

Of these the rug-making has proved by far the most popular, and the rugs made are easily sold. The work is quiet, and can be carried on comfortably by a man in bed. Bags are required to hold the material, and bed spreads must be provided to prevent the wool soiling the counterpanes. Canvas, wools and implements can all be procured from Messrs. Jones and Company, Wool Merchants, Bridgnorth, as well as full instructions for the rug-making. It is desirable that the shades of wool used should be selected by the Committee, so as to prevent inartistic combinations in the rugs.

Mrs. Wynne and other ladies come weekly to the hospital to teach the work to the men, and pupils have been numerous. The heaviest part of the organisation falls upon the Matron, who gives out the work and receives it back, keeps the lists of the men, and takes the orders for the rugs; without her help and interest the scheme cannot possibly succeed. A great part of the success at Colchester has been due to the active exertions of Miss Cole, R.R.C., Q.A.I.M.N.S.

When a man has finished his rug he can either keep it and be charged 3s. 8½d. (the exact price of the materials), or he can hand it over and receive 1s. for his trouble in making it, the rug being sold to the public for 5s. which gives a profit of 3½d. to the Society on a three-feet rug. Larger sized rugs are dealt with in the same way, as are also the nets, knitted socks, &c. All charges are made out by the Treasurer, and recovered in the same way as hospital stoppages. All payments to the men are also made regimentally.

The funds cannot be quite self-supporting, as, besides postage, &c., there is a certain loss in spoilt materials, and men occasionally pass to the reserve or otherwise disappear before charges can be recovered from them.

In November last, Mrs. Wynne took advantage of the Annual Trades' Exhibition at Colchester to have a military stall, at which, besides a number of articles from the Soldiers' and Sailors' Help Society, all the rugs remaining on hand were sold and orders obtained for others.

It is reported here that at Woolwich the patients do bent-iron work with success, and it is quite possible that iron-work, fret-work, and some kinds of brush-work may be started at Colchester in the future, but at present the limited *répertoire* already mentioned has been found sufficient. It may be added that basket-making from bass—which has recently been introduced—seems likely to be popular.

Since July 14th, the patients in hospital at Colchester have made ninety-five rugs (of which forty-three were kept by their makers and fifty-two sold by the Association), thirty-eight nets, twenty-three pairs of socks and stockings, and two shawls; £3 8s. 1d. has been paid to soldiers for work done in hospital. The total sum received from all sources amounts to £58 9s., and the total expenditure on materials and implements to £42 0s. 8½d. The amount obtained for the Association at the Military Stall at the Colchester Trades' Exhibition by the sale of rugs, &c., was £11 3s. 11½d.

Editorial.

MALTA FEVER.

In the April and June numbers of this Journal for 1904, there appeared Editorials bringing up to that date our knowledge of Malta fever. A good deal of work has been done since then, and many new facts and observations obtained. It will be well, then, to again make a survey of this subject, which is of such importance to the Army and Navy in Malta, this fever being said to give rise, yearly, to some 120,000 days of disease among the soldiers and sailors stationed there. The same arrangement of the new matter will be made as in previous papers, in order to make comparison easy. This arrangement brings the subject, broadly, under four heads: I. Epidemiology. II. How does the *Micrococcus melitensis* leave the body. III. The Micrococcus outside the body. IV. How does the Micrococcus gain entrance to the body? But first a word in regard to the history of the investigation of this disease since 1904.

Historical.—The chief event of importance which has happened during the last two years is that a Committee has been formed by the Royal Society, at the request of the Colonial Office, Admiralty, and War Office, to take steps for the investigation of this fever. A Commission, consisting of Major W. H. Horrocks, R.A.M.C., Staff-Surgeon E. A. Shaw, R.N., Dr. T. Zammit, and Captain J. Crawford Kennedy, R.A.M.C., has been at work during the last two seasons, with the result that many interesting observations have been made. Dr. R. W. Johnstone, Local Government Board, went out to Malta during the summer of 1904 to work at the epidemiology of the fever, and Lieutenant-Colonel A. M. Davies, R.A.M.C., took up the same line of work in the summer of 1905. Fleet-Surgeon P. W. Bassett-Smith, R.N., Staff-Surgeon R. T. Gilmour, R.N., and Dr. J. W. H. Eyre, have also sent in Reports.

I.—Epidemiology.

The keynote of this paper is prevention. What we have set out to do is to discover some fundamental fact in the mode of spread of Malta fever, which knowledge will enable us to lessen the numbers attacked in future. Under this heading of Epidemiology are there-

fore collected observations which may assist in this search, and help to point to the factor or factors concerned in the spread of the infection. If Malta fever is spread by contaminated dust, then the curve of rain-fall should show some connection. If by mosquitoes, the temperature-curve. If the spread is due to insanitary conditions, the study of the incidence among various classes of the community might be expected to throw light. If the infection is altogether due to an animal, such as the goat, then the fever should be absent where the goat is absent, and thus the Geographical Distribution might give some aid.

Geographical Distribution.—The most important addition to our knowledge of the distribution of this fever is contained in a paper by Lieutenant-Colonel C. Birt, R.A.M.C., on Mediterranean Fever in South Africa, in which he shows conclusively that Mediterranean fever is endemic in certain parts of the Orange River Colony. It has been the fashion of late to try to limit the geographical distribution of Malta fever to Malta itself. Especially has it been doubted if it is endemic in India. This doubt has now been set at rest by Lamb and Pais, who have isolated the *M. melitensis* from the spleens of a number of persons in the Punjab suspected to be suffering from Malta fever.

Distribution in Malta.—In the previous Editorials it was stated that Malta fever is as prevalent in the country villages as in the big cities. The same result is arrived at by Dr. Johnstone in his Report to the Royal Society, dated April, 1905. He says, that the very general distribution of Malta fever throughout the island is perhaps the most striking feature of this disease. It is by no means the localities closest to the harbours which suffer most severely. Hamrun, a somewhat squalid suburb, and the combined villages of Lia, Attard, and Balzan, show the heaviest incidence, while Valletta and the three fortified towns are amongst the least severely attacked. He divides Malta into three areas, and gives the rates of incidence per 10,000 for each area as follows:—

(1) Urban drained area	18·8
(2) Suburban undrained area	41·8
(3) Rural area	33·4

These figures are probably much smaller than they should be, on account of deficient notification. Johnstone concludes, that the distribution of Malta fever amongst the civil population goes to show that, outside certain paved and drained areas, aggregation of persons in one locality, and density of population upon area in a district, favour the spread of the disease. What factor this is due

to he cannot say, although he has suspicions that excretal pollution of the hands and the food, or the dust of houses, may have something to say to the spread of infection.

Ambulatory Cases of Malta Fever.—Related to the distribution of this fever in Malta, is the question as to whether there is any danger to the community from unnotified ambulatory cases. If it were shown that a large number of Maltese are going about their ordinary work, showing no symptoms of Malta fever, but carrying the *M. melitensis* in their blood, and excreting it in their urine, it is possible that this, as in enteric, would constitute a danger. Shaw undertook the investigation of this. He examined 525 men working in the dockyard by the serum test, and seventy-nine of these responded. Twenty-two out of the seventy-nine responded in a marked manner, and these were examined as to their urine and blood containing the specific micro-organism. In nine out of the twenty-two the micrococcus was recovered from the urine, and in four from the blood. It is therefore possible that 10 to 15 per cent. of the native population are suffering from some mild form of the fever, or from the effects of an attack within the previous two or three years, and that 1 to 2 per cent. excrete the micrococcus in their urine, and are therefore a possible danger to the community.

Are other Animals besides Man Susceptible to Malta Fever?—Attention was first directed to the goats, which are so numerous and so much a feature in every-day life in Malta, and which supply most of the milk used in the island. It is unnecessary to describe the various steps which led up to the important discovery that, roughly speaking, about 50 per cent. of the goats in Malta are affected by this disease, and that 10 per cent. are excreting the micrococcus in their milk.

This led to the examination of the cows in the island. Thirty-three were examined by Shaw by means of the serum agglutination test. Nine out of the thirty-three responded to the test. The milk of these nine was then examined for the presence of the micrococcus, and it was found in two.

Then the mules were suspected. Kennedy examined eighty-seven of these animals, and obtained a positive reaction in thirty-nine. The serum reaction was in every case rather low, only two reaching 1—40. He concludes that mules suffer in a mild way from Malta fever infection.

Lastly, the dogs were examined by Kennedy. One hundred and fourteen were tested, with a positive agglutination reaction in

fifteen. These fifteen dogs were examined *post-mortem* and the micrococcus recovered from the mesenteric glands of one.

It appears, then, that even the dog can harbour the virus of Malta fever, and as it is reported that there are some 40,000 in Malta and Gozo, it is possible that the dog may act to some small degree as a carrier of the disease.

In addition to these domestic animals the monkey takes the fever readily by either feeding or subcutaneous inoculation, and the common laboratory animals—the rabbit and guinea-pig—can also be artificially infected.

This micrococcus is therefore capable of living in and affecting many species of animals. The disease it sets up is most severe in man and next in the monkey; it does not appear to give rise to marked symptoms in the domestic animals.

Relation of Temperature and Rainfall to Malta Fever.—The following chart, given by Johnstone, shows the temperature, rainfall and number of cases amongst the civil population during the period 1894-1903.

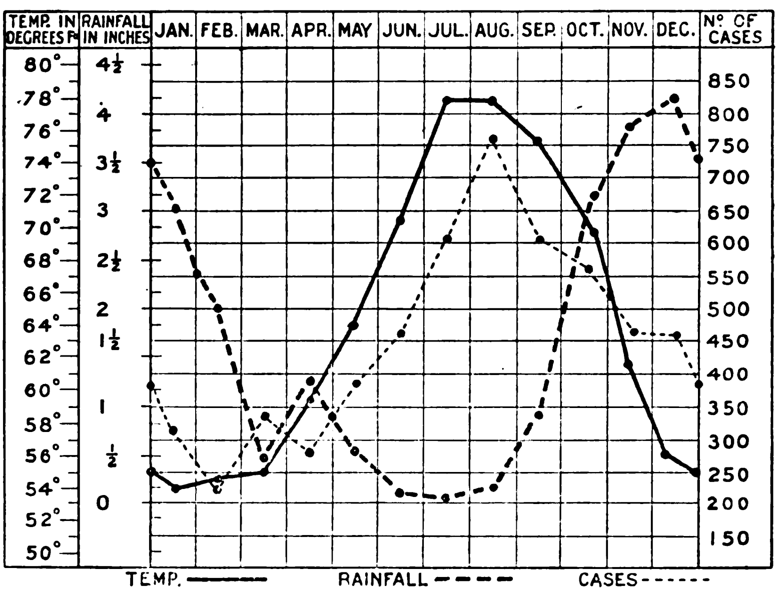


CHART 1.

Johnstone's chart may be compared with the next, which represents the number of cases admitted into the Station Hospital,

Valletta, during fourteen years, with the temperature and rainfall as registered in Army Records.

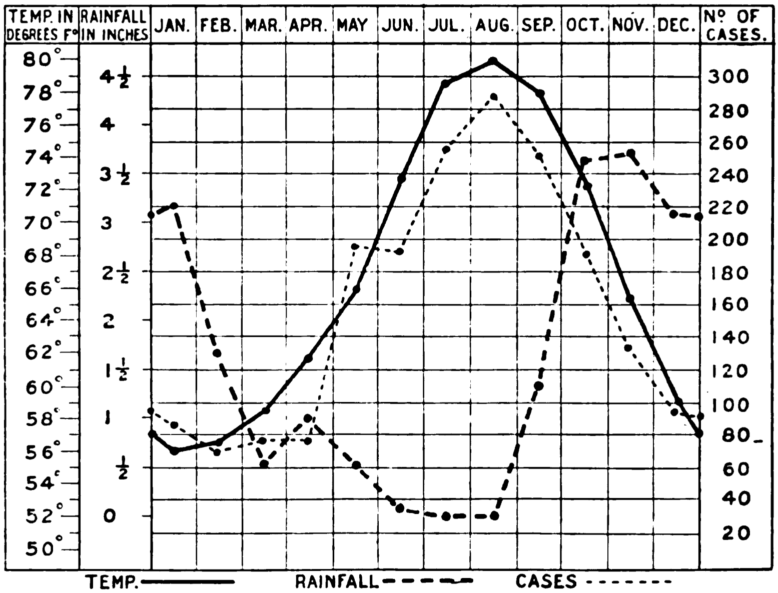


CHART 2.

Johnstone writes: "It will be at once seen that there is a very close correspondence between the curve representing the temperature and that representing the number of cases. The rise of the latter curve follows that of the former at an interval of about one month, which would be approximately sufficient to allow for the incubation and notification if the incidence of fever were directly dependent upon the temperature of the air. The case-curve attains its maximum in July, but, unlike the temperature-curve, it at once commences to drop, so that it would appear that whatever connection the air temperature may have with case incidence, it does not remain so obvious after the former has attained its maximum. The curve representing rainfall is, in general, the inverse of that representing temperature. The case-curve commences to drop at the same time that the rainfall-curve commences to rise, allowing no interval for incubation and notification, so that the connection is not clear; nor does the steep rise of the rainfall-curve at the end of September produce a corresponding steep decline in the case-curve, as might have been expected, were the connection between the two intimate."

It also appears to us as if there must be some connection between Malta fever and temperature, but what it is is impossible at present to say. If there is, as is probably the case, more than one factor in the spread of the disease, dust or mosquitoes might account for the prevalence in the hot, dry months, and some other factor, such as goats' milk, for its persistence throughout the year.

Seasonal Incidence.—The following chart represents the number of cases of Malta fever admitted to the Station Hospital, Valletta, each month, for fourteen years :—

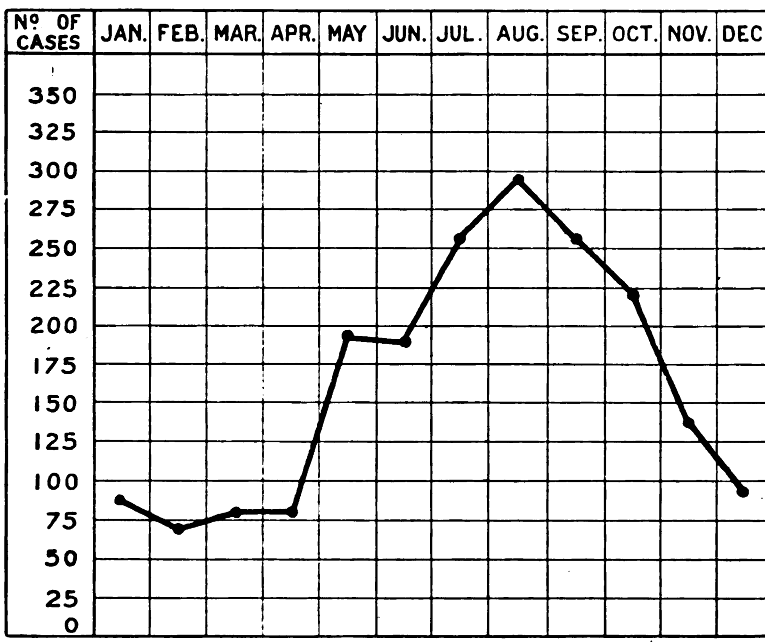


CHART 3.

The numbers are taken from papers by Hughes, Kennedy and the writer, and may be relied upon as being fairly correct.

Dr. Johnstone also gives a chart in his Report, showing the number of cases amongst the civil population during the period 1894-1903, which is also given. (See Chart 4.)

These charts are fairly alike, and from them may be learnt that the fewest number of cases of the fever occur in the cold months, that the curve begins to rise in May, and reaches its highest point in August, and that the greatest number of cases occur in July, August and September. One important point should

be noted: that although there is a great increase in the prevalence of Malta fever during the hot months, yet many cases also occur in winter. In the one chart, the cases in January, February and March are about one-third as many as in July, August and September, and in the other about one-half. Now what interpretation can be put on these charts? If the disease is spread by contaminated dust, or by mosquitoes, one would expect to find the curve sink much further during the rainy, cold months of winter; if, on the other hand, goats' milk is chiefly to blame, then it is difficult to understand the difference of incidence in summer and winter. As mentioned above, two or more factors may come in to determine the curve of the seasonal prevalence. It is evident, however, that curves of temperature, rainfall and seasonal prevalence will not as yet give us the clue sought.

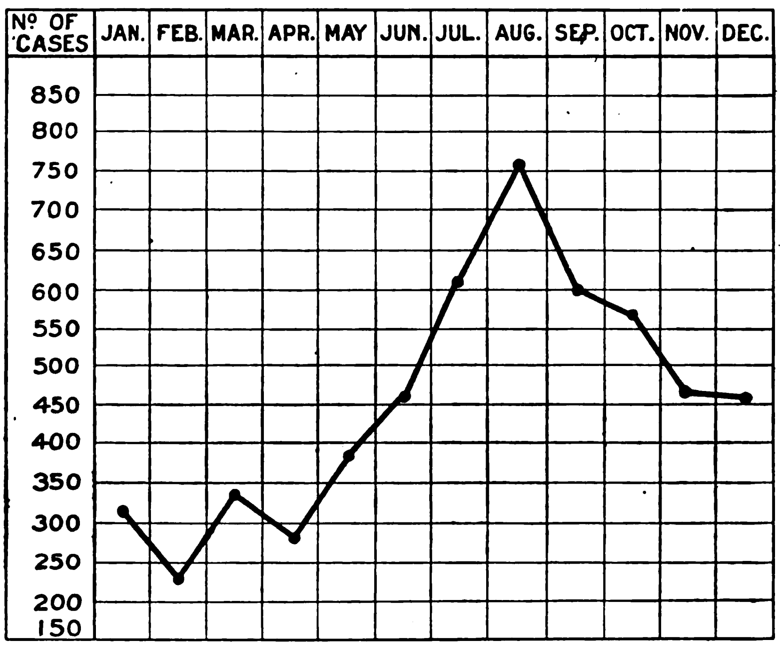


CHART 4.

Incubation Period.—It is most important that this should be known as accurately as possible. The work of the epidemiologist depends much on this knowledge, as it enables him to locate the sick at the time of infection. It has always seemed likely that given a correct incubation period, the careful collection of a few

hundred cases, with the circumstances of their surroundings at the time of infection, should give the key to the mode of spread of this disease. Every case which occurs among our soldiers and sailors should certainly be subjected to the most careful study from this point of view, in order that a body of evidence may be collected to this end. Johnstone came to the conclusion that the incubation of Malta fever ranges about a period of fourteen days. Kennedy, in working at the incidence among patients in hospital, excluded all cases diagnosed Malta fever within twenty days after admission. Davies writes: "As we are at present ignorant of the path of infection in man, we must assume that incubation may be as short as about a week, and may be as long as about five weeks, according as the infection is by inoculation or by feeding. But considering the very much smaller doses of pathogenic material likely to be actually absorbed than those used experimentally in the laboratory, it seems probable that not less than a fortnight should be regarded as a minimum period, and that the maximum period should be extended to about six weeks at least."

From subcutaneous inoculation experiments on monkeys, it would appear that about five days elapse before signs of the disease appear. In feeding experiments, one monkey fed on infective material on two successive days, did not show any symptoms for thirty-two days; and Horrocks thinks from his experiments with infective goats' milk, that the incubation period may be long, and may even extend to two months.

The writer, in previous papers, stated that it is impossible to state definitely how long the period of incubation is, but that it probably ranges from a few days, say six, to twenty or thirty. The conclusion at the present time must be much the same—more observations, more experiments are wanted.

Does one attack of Malta Fever confer Immunity?—In 1889, the writer stated that his experience led him to the general conclusion that, as in many other infective diseases, one attack of this fever does, as a rule, confer immunity.

The only experiment made by the Commission bearing on this matter is that which Shaw reports. Two monkeys which had recovered from an attack of Malta fever were further inoculated subcutaneously. No rise of temperature or other symptom of fever supervened.

Length of Service in Malta.—According to Johnstone, the heaviest incidence is upon men with less than one year's service. The incidence upon men with over two years' service is less than

half that upon men with under two years' service. This, he considers, is no doubt due to a large extent to the elimination of the more susceptible subjects.

Case Mortality.—In 1889, the writer put it at about 2 per cent. Hughes, in 1897, stated that during the six years he spent in Malta the mortality varied greatly from year to year, but averaged fairly constantly slightly over 2 per cent. of the cases attacked. Johnstone states that, in the Army, during the period 1897 to 1903, the case mortality was 3·2 per cent.; among the civil population 8·9 per cent. This high mortality among the civilians he considers is largely due to the fact that mild cases more often escape notification than severe ones.

II.—How does the *Micrococcus melitensis* Leave the Body?

The *M. melitensis* has never been found, up to the present time, outside the bodies of warm-blooded animals or blood-sucking insects, except under artificial conditions. We will, therefore, describe how it leaves the body before studying its behaviour outside. The distribution of the micrococcus in the body on *post-mortem* examination has been made by Kennedy. He found it in the spleen, liver, kidneys, lymphatic glands, salivary glands, blood and bile, but not in the intestines. He thinks the examination of the lymphatic glands to be most important, as they are often the only organs which contain it.

The various channels by which a micro-organism might be supposed to leave the body, are by such secretions as the tears, nasal mucus, saliva, bronchial secretion by expectoration, gastric by vomiting, sweat, milk, urine and fæces. Further, an important way of leaving the body may be by way of the blood, by the agency of biting insects. Several of these routes have been investigated by the members of the Commission.

Expired Air.—A great many experiments were made to try to discover the micrococcus in expired air. Patients in various stages of the disease were made to breathe through an apparatus containing sterile broth, and this broth was then plated out. Two monkeys were also injected with similar broth. In no single case was the microbe recovered.

Saliva, Expectoration, Sweat, and Scrapings of Skin.—Many experiments were made by Horrocks, Shaw and Kennedy on these lines, but in no case was the micrococcus found.

Fæces.—More than a thousand plates were examined by Horrocks without success. It is probable, however, that it does

leave the body in this way in small numbers, as it has been found in the bile of man; and Eyre has found it all along the small and large intestines of experimental animals. It must surely be in small numbers in man, else it would have appeared on the plates, and therefore this source of infection is probably not an important one.

Urine.—This seems to be one of the main paths by which the micrococcus leaves the body. Horrocks isolated it thirty-nine times from thirteen cases of Mediterranean fever. He did not find it earlier than the fifteenth day, or later than the eighty-second day of disease. The average number per cubic centimetre was fifty-three (maximum 596, minimum 3). Kennedy examined sixty-one cases, and isolated it from the urine of thirty-three (54 per cent.). He examined 1,974 samples from these sixty-one cases, and recovered it 186 times (9·5 per cent.). The earliest day he recovered it was the twenty-first, and the latest the two hundred and forty-ninth. On two occasions he found the micrococci innumerable in the urine. The other cases gave an average of 139 per cubic centimetre (maximum 1,068, minimum 3).

The result of these experiments shows that the micrococcus is excreted in the urine of Malta fever cases from about the fifteenth day of disease until after convalescence is established. In one hundred samples of urine it will probably be present in ten. The number of micrococci present, except on rare occasions, is small. The urine, then, is the most important path we know of, except milk, by which the virus can leave the body. Infection by means of food, dust, &c., contaminated by Malta fever urine, must, therefore, receive careful consideration.

Milk.—This is, perhaps, from an etiological point of view, the most important route by which the micrococcus leaves the body. Observations up to the present have only been made on the milk of the lower animals, especially the goat and cow, but there can be little doubt that it is also excreted in human milk. It is not possible to give the number of micrococci per cubic centimetre in the milk, as this fluid was always centrifuged before being plated, but practically there were sufficient present to infect healthy monkeys when the milk was given by the mouth. This subject will be more fully dealt with in the section on infection by goats' milk.

Blood.—The presence of the micrococci in the peripheral blood has been investigated very fully by the Commission, as the subject is important from the point of view of infection by means of biting insects. Gilmour found it in 82 per cent., Zammit in 54 per cent., Shaw in 68 per cent. and Bassett-Smith in 59 per cent. of the cases examined.

The micrococci are never numerous in the blood. The smallest quantity of blood in which it was found by Shaw was 4 cubic millimetres, and Gilmour states that " the number per cubic centimetre is small, rarely reaching 100." The largest number found by him was 400 per cubic centimetre. These numbers may not be very accurate, but the broad fact remains that this micro-organism is never found in large numbers in the blood.

The question of infection by way of the blood, through the agency of mosquitoes, &c., requires careful consideration. This will be done in the section on how the micrococcus gains entrance to the body; suffice to point out here that the micrococci are so scarce in the peripheral blood, that it is difficult to imagine this disease being conveyed by mosquitoes or other biting insects. It must be borne in mind, however, that the latest teaching on the subject of plague would go to show that the spread of that disease is mainly by the rat-flea, and the plague bacilli are absent, or almost absent, from the blood of the rat, except during the last few hours of life.

III.—The Micrococcus Outside the Body.

The M. melitensis.—There is little to add to the description the writer has written in previous Editorials. In regard to the best culture medium for separating this micro-organism from others, and of recognising it when found, a word may be said. During the work of the last two years, Horrocks has found a medium, containing glucose, litmus, nutrose, and agar, and having an acid reaction of + 10 (Eyre's scale), to be the most satisfactory material for separating it from other bacteria. To recognise it, he writes: " A micro-organism which agglutinates with a specific animal serum in a high dilution, does not ferment glucose, renders milk alkaline without coagulation, may justly be regarded as the *M. melitensis.*"[1]

Shaw tried to make out if there was any likelihood of being able to separate it from other species of bacteria by means of filtration. As this microbe is small, it was thought that a filter might be found which would let it pass through, while the bulk of the ordinary water bacteria were caught. Experiments were made with Chamberland filters, F, and with Berkefeld filters, N, V, and W, but in no case did it pass through. The experiment, therefore,

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[1] *Vide* Horrocks' Reports reprinted in the Royal Army Medical Corps Journal, vol. v.

failed, and it does not appear likely that this method will succeed in the future.

Duration of Life in Water.—The following table gives the result of the several experiments:—

Sterilised.

	Number of experiments	Minimum number of days	Maximum number of days	Average number of days
Tap-water	12	6	50	32
Sea-water	6	13	34	23
Unsterilised.				
Tap-water	6	7	73	42
Sea-water	2	0	46	23
Tank-water	2	10	12	11

From this it can be seen that it can retain its vitality in various waters, sterile and non-sterile, for considerable periods of time, but there is no proof that any multiplication takes place; it seems rather to die out gradually, and the length of time it is recovered depends a good deal on the number put into the water at first. Up to the present, it has never been found in water under natural conditions.

Although it appears to be possible that infection may be carried by means of drinking water to which the micrococcus has gained entrance, still there is no proof that this has ever occurred, or does occur, or is an important factor in the spread of this disease. The old speculation in regard to the part played by the harbour water may now be abandoned.

Duration of Life in Urine from Mediterranean Fever Cases.—In view of the fact, as shown above, that the micrococcus is frequently excreted in urine from Mediterranean fever cases, it seemed important to find out how long it retained its vitality in this medium. The point was approached in various ways. Bassett-Smith sterilised various Mediterranean fever urines, and artificially inoculated them. He found it retained its vitality on an average for twenty-two days (minimum 9, maximum 41). Kennedy, working with naturally-infected urines, found that it could be recovered on an average for eight days (minimum 1, maximum 16).

Duration of Life in a Dry Condition in Sterilised Materials :—

Method used	Number of experiments	Minimum number of days	Maximum number of days	Average number of days
Dried on cover-slips ..	2	15	16	15·5
On flannel, serge, &c. ..	7	7	80	28
In sterile dust, sand, lime-stone, &c.	19	3	91	31

Duration of Life in natural non-sterile Street Dust which has been artificially inoculated with an Emulsion of the Micrococci from a Culture.—Horrocks made several experiments in this direction, with the result that living micrococci were recovered for twenty-eight days. When he tried the experiment with ordinary non-sterile manured garden soil, he was only able to recover it for five days.

These experiments are, of course, laboratory experiments, in which large quantities of the cocci are added to the dust or soil. It is difficult to picture such gross contamination of the soil under natural conditions. This leads us to the next question.

Duration of Life in non-sterile Street Dust which has been wet with Mediterranean Fever Urine.—The most usual way in which the dust or soil becomes contaminated is probably by the urine of men or animals suffering from Mediterranean fever. Horrocks, therefore, tried to recover the micrococcus from street dust which he had artificially contaminated with a urine known to be rich in these organisms, but in no instance did he succeed, not even when he first sterilised the dust. Of course, this is no argument that it is really killed off, it only proves that it cannot be recovered on account of the overwhelming numbers of other micro-organisms which appear in the urine-contaminated dust. It may be that it is still alive and capable of doing mischief.

Conclusions.—On the whole, these experiments show that the *M. melitensis* is a fairly resistant organism, and that it can live in a moist or dry state outside the body for long periods of time. But we have seen that in the majority of cases there are comparatively few micrococci excreted in the urine, so that gross contamination of the dust can seldom or never occur. Again, when we consider the bactericidal action of the sun, and the enormous dilution the *M. melitensis* must undergo when the dust is raised in clouds into the air, it is difficult to believe that this fever can be spread to any extent through the dust or soil. We may therefore conclude this section by stating that, outside the body, the *M. melitensis* shows no

signs of leading a saprophytic life—it does not thrive and multiply—but, on the other hand, it is proved to be a resistant organism which can retain its vitality for long periods under varied conditions.

IV.—How does the Micrococcus gain Entrance to the Body?

It is on finding the correct answer to this question that the success of prevention probably hangs. Does the virus enter by way of the alimentary canal, by the lungs, through mucous membranes, or through the skin? Is it conveyed from the sick to the healthy by means of food, water, milk, dust, or by biting insects? The difficulty in dealing with human infectious diseases is to find a suitable animal to experiment with, man not being available. Fortunately, in Malta fever we have the monkey, which is also susceptible to the disease. How far one can reason from the behaviour of the monkey to the virus to what happens in man, is difficult to say, but it may be assumed that there is a practical degree of similarity.

In trying to find out some method of prevention it is evident that the important thing to strive for is the narrowing down of the paths of infection. In yellow fever, as long as it was believed that it could be spread by contact, fomites, food, water, &c., nothing could be done. The moment the mode of infection was narrowed down to a particular species of mosquito the problem of prevention was simple. In the same way with Malta fever, if it can be spread by contact, contamination of food, water, by the inhalation of dust, sewer air, &c., it will be impossible to do more than recommend the ordinary established rules of hygiene. But on the other hand, if the mode of spread could be narrowed down to such a vehicle as milk, or a mosquito, something rapid and dramatic in the way of prevention might be attempted.

By Contact?—The only experiments which have been made in order to prove this have been made with monkeys. In 1904 two monkeys took the fever naturally. They were both living close to affected monkeys, and it was supposed, and probably rightly so, that they had taken the disease from their neighbours. This was repeated as an experiment on three occasions, with a positive result in two. Experiments made in which the contact was limited, that is to say, in which infection by urine or mosquitoes was excluded, never succeeded.

It was therefore concluded that the monkeys probably took the disease by having their food contaminated with the urine of their

neighbours, or it might possibly be by eating ecto-parasites containing blood, and that, therefore, contact resolved itself into a feeding experiment.

As the chance of man having his food contaminated in this way is very remote, it is probable that very few cases of Mediterranean fever arise in this manner. At the same time, this mode of infection cannot be absolutely excluded, and the high incidence, according to Johnstone, among those who nurse Malta fever cases may possibly be due to insufficient care in the handling of the micrococci-containing urine of the patients. But the fact that no case of Mediterranean fever has ever been known to occur at Netley or Haslar among the patients, sisters or orderlies, is sufficient proof that, in practice, contact as a factor in the causation may be almost put out of court.

By Dust Contaminated with Micrococcus melitensis?—In view of the fact that this organism can retain vitality for a long time in a dry condition, it was thought probable that the infection might be conveyed from the sick to the healthy by means of dust. Dust contaminated with urine from Mediterranean fever cases might be blown into the atmosphere and so be inhaled or swallowed. In order to put this to the test various experiments were made. At first, artificially contaminated dust was used. The dust was sterilised, then made wet with an emulsion of the organisms from agar cultures, and finally dried.

Horrocks relates two experiments, in one of which this dust was blown about the cage, and in the other blown directly into the nose and throat. Both were successful.

Shaw also describes two experiments of blowing contaminated dust about an air-tight box containing the monkeys, but both were unsuccessful. In three experiments by him in which the dust was blown into the nostrils, one remained negative, and two gave a positive result. Of four experiments in which he frequently dropped dust into the conjunctival sac, two remained negative, two became infected.

From these experiments it may be concluded that *artificially* contaminated dust may convey Malta fever to healthy animals. This is no proof, however, that this ever occurs in Nature. Artificially contaminated dust contains myriads of the specific micrococci. Dust in Nature can contain but few, seeing how sparse they are in the urine as a rule. The dust blowing about under natural conditions must rapidly dilute the micrococci to an extraordinary extent, so that we can only picture a micrococcus here and there in a great

quantity of dust. But the conditions occurring in Nature can be more closely imitated if the dust is contaminated with Malta fever urine instead of from a culture.

By Dust Artificially Contaminated with the Urine of Malta Fever Patients?—A urine known to contain the micrococci was chosen to contaminate the dust. After drying, the infective dust was blown into the nostrils and added to the food of monkeys. Four experiments are reported by Horrocks, lasting from twelve days to two months, but in no case did infection occur. It is difficult to understand why this experiment did not succeed. The dust was infected by a urine containing exceptionally large numbers of the micrococci, and immediately dried. It was evidently added in fairly large quantities to the food, as three out of the four animals suffered from severe vomiting and diarrhœa. Shaw also reports that he experimented on four monkeys in the same way, but did not succeed in conveying the infection in a single case.

These experiments are much more severe than anything we can imagine occurring in Nature, and tend to throw doubt on dust being an important factor in the spread of Mediterranean fever. It must be mentioned here, however, that Horrocks states that he succeeded in infecting two goats by adding this dust to their food.

By Dust collected from Suspicious Places?—This is, of course, the crucial experiment as far as infection by dust is concerned. Judging from the non-success of the last series of experiments with urine-contaminated dust, it was little likely that this experiment would succeed. It was, however, necessary to make the attempt. Dust was collected from fever wards, from places where cases had occurred, from goats' sheds, where affected goats were milked, from around urinals, &c., and blown about the cages and food of monkeys, or injected subcutaneously. Up to the present these attempts have failed. At the same time, it must be admitted that but few experiments have been made. Horrocks only experimented on seven monkeys, and it takes many experiments to prove a negative.

What then does the evidence which has been collected in regard to the spread of Malta fever by means of dust amount to? When one considers the numbers of ambulatory and convalescent cases which must frequently be excreting this organism in their urine, one is led to think that this must constitute a danger of spreading the disease. At the same time it must be borne in mind that there is no absolute proof that this is so; the micrococcus has never been recovered from urine-contaminated places, or from

the dust of such places; nor has the disease been set up in any animal by artificial inoculation with material from such places. Theoretically, there seems to be danger from the scattering broadcast of such a virulent and resistant microbe, but it is possible that not a single case of infection occurs in this way. As sound practice, however, any sanitary measures which could be devised to prevent the fouling of the soil by Malta fever urine would be steps in the right direction.

The conclusion to be drawn from these experiments on the conveyance of Malta fever by means of dust is, that up to the present, there is no absolute proof that dust, as it occurs under natural conditions, ever conveys the disease from the sick to the healthy.

By way of the Alimentary Canal?—It has been repeatedly demonstrated by experiment that a small quantity of a culture applied to a scratch, or injected under the skin, will give rise to Malta fever in man and monkeys. Also that dust or fluids containing the micrococci, if applied to the unbroken conjunctiva, nasal passages, pharynx, interior of the larynx and trachea of monkeys, will set up this fever.

In a previous Editorial the writer stated that experiment was against the micrococci gaining access to the body by water or food. This idea was based on reports by Wright and Zammit, in which they stated that they had failed to induce the disease by feeding experiments. The evidence now available is given in the following table.

This question of the micrococcus gaining entrance by way of the alimentary canal is one of the most important with which we have to deal. It is most essential that it should be known without any shadow of doubt whether or not a man can take this fever by swallowing the micrococci in his food or drink. It would also be well to know if this mode of infection takes place readily, or whether many micrococci are wanted, and some particular state of the digestive organs. Now a careful study of the table below must convince anyone that Malta fever can be conveyed to monkeys by feeding experiments, and if to monkeys, then probably to man. Especially suggestive are the experiments on monkeys numbered 4, 5, and 99, with milk from affected goats. When an animal is fed day after day on an artificially contaminated food containing myriads of micrococci the result may be misleading, just as in the case of dust experiments. But with ordinary milk taken from goats in the street, the natural conditions are exactly followed and there seems little room for fallacy.

Species of animal		Mode of infection. M. = *M. melitensis*	Probable time which elapsed before infection took place in days	Result. + Infection − No infection	Remarks
Monkey	39	Feeding on potato containing M.	30	+	Recovered the M. from spleen (Horrocks).
,,	40	Do. do.	31	+	Had serum reaction, 1 in 100 (Horrocks).
,,	66	Accidental feeding ..	..	+	Probably by feeding (Horrocks).
,,	72	Milk + M.; stomach tube	..	+	(Horrocks.)
,,	113	Dust + Mediterranean fever urine. Dried	..	−	Do.
,,	114	Do. do.	..	−	Do.
,,	119	Dust + Mediterranean fever urine. Moist	..	+	M. recovered (Horrocks.)
,,	124	Potato + M. from spleen	..	+	Agglutination, 1 in 1,000 (Shaw).
,,	125	Do. do.	..	+	Agglutination, 1 in 800 (Shaw).
,,	126	Potato + M. from urine	..	+	Agglutination, 1 in 80 (Shaw).
,,	127	Do. do.	..	+	Agglutination, 1 in 800 (Shaw).
,,	2	Milk from affected goat	..	+	M. recovered (Horrocks and Kennedy).
,,	4	Do. do.	..	+	Do. do. do.
,,	5	Do. do.	..	+	Do. do. do.
,,	99	Do. do.	..	+	Do. do. do.
,,	6	Culture from milk ..	..	+	Do. do. do.
,,	7	Do. do. ..	..	+	Do. do. do.
,,	8	Do. do. ..	..	+	Do. do. do.
,,	9	Do. do. ..	..	+	Do. do. do.
,,	19	Do. do. ..	18	+	Blood reacts. Experiment continuing (Horrocks and Kennedy).
,,	19*a*	Do. do. ..	32	+	M. recovered (Horrocks and Kennedy).
Kid	9	Milk from affected goat	..	−	Blood reacted, 1 in 10. Experiment still going on (Horrocks and Kennedy).
,,	19*a*	Mother's milk ..	..	−	Agglutination, 1 in 50 (Horrocks and Kennedy).
Goat	12	Culture from milk ..	..	+	Blood reacts, 1 in 40. Experiment still going on (Horrocks and Kennedy).
,,	13	Mediterranean fever urine and dust	..	+	M. recovered from milk (Horrocks and Kennedy).
,,	14	Do. do.	..	+	Agglutination, 1 in 20 (Horrocks and Kennedy).
,,	4	Milk + culture ..	..	+	Recovered from milk (Horrocks and Kennedy).

By Means of Goats' Milk?—This is probably the most important question in the whole subject of the etiology of Mediterranean fever. When the astonishing discovery was first made that goats could be affected by Malta fever and act as a reservoir of the virus, and that

they were frequently excreting it in their milk, it was hoped that the main source of infection had been discovered. Whether this is so or not still remains to be proved. What are the facts?

About one thousand goats taken from all parts of the country have been examined by the Commission. The goats were examined in the first instance, for a serum, or milk reaction to the micrococcus, and then the milk of those which gave a reaction was directly examined by plate cultivation for the presence of the micro-organism. Shortly, it may be stated, that as the result of this examination it is shown that, broadly speaking, some 50 per cent. of the goats in Malta respond to the agglutination reaction, and that 10 per cent. are actually excreting the *M. melitensis* in their milk. This excretion may continue for three months without any symptoms of disease in the goat, or change in the appearance of the milk. The mode of distributing the milk in Malta adds to the danger. Herds of goats constantly perambulate the streets of the towns and villages. When milk is wanted the housewife beckons to the nearest herd-boy, who drags up a goat to the door and milks direct into a dish provided by the consumer.

But is it proved that the drinking of infected goats' milk by man will give rise to the disease? To this question, of course, there can be no direct answer; but there is, as already mentioned, abundant proof that monkeys fed on naturally infected goats' milk take the disease after a time, and therefore there can be little doubt that the same thing occurs in man. It cannot be said that the monkeys take the disease readily or rapidly when fed on infected milk. Horrocks gives four experiments, in each of which infection took place, but only after twenty-four, thirty-three, seventy and seventy days respectively. It seems to be even more difficult to infect goats. Experiments made by Horrocks and Kennedy, in which a goat and four kids were fed on infected milk, showed no signs of infection after four months.

As bearing on the possible infection of man by goats' milk, Sir Charles Metcalfe informed the writer that the introduction of Maltese goats into Rhodesia was followed by an outbreak of Mediterranean fever. Again, the case of the s.s. "Joshua Nicholson" can be cited. In 1905, this steamer shipped sixty-five goats at Malta for export to the United States of America. The milk was drunk by the captain and many of the crew, with the result that an epidemic of Mediterranean fever broke out on board the vessel. Dr. Strachan, of Phillippolis, in the Orange River Colony, who discovered that Malta fever was endemic in some parts of that

Colony, thinks it probable that the infection has been spread by goats' milk, which is largely used in these districts. In India also, Captain Forster, I.M.S., isolated the micrococcus from the milk of goats supplying the 14th Sikhs at Ferozapore, among whom cases of Malta fever had occurred. Lastly, Davies found that the children in Malta who drank unboiled milk suffered four times as much as those who drank boiled milk.

Taking all these facts into consideration, there can be little doubt that Malta fever is conveyed to man by means of goats' milk.

By Mosquitoes or other Biting Insects ?—This is a theory which has been brought forward again and again of late years. Horrocks and Kennedy, in their last Report, go so far as to say that it is extremely probable that human beings are infected by the bites of infected mosquitoes. Let us see what evidence there is for this. The species found in Malta appear to be *Culex pipiens*, *Culex fatigans*, *Culex spathipalpis*, *Stegomyia fasciata*, and *Acartomyia zammitii*. Theobald thought that probably *A. zammitii* would be found to be the carrier, but as this species only breeds in the salt-pans along the coast, it is difficult to believe that it is the carrier of a disease which is as common in the inland towns and villages as on the sea-coast.

Zammit brought forward a case in which he claimed to have infected a monkey by feeding *S. fasciata* on it after they had fed on a Malta fever patient. He allowed two of these mosquitoes to bite the monkey forty-eight hours after feeding on the man, and ten days later the monkey was again bitten by one of the same mosquitoes. Thirteen days after the first feeding experiment the monkey had a rise of temperature, and shortly afterwards its blood reacted. There is no apparent fallacy in this experiment, as the monkey was well removed from any infected monkeys, or other known source of infection. Horrocks and Kennedy also relate how the laboratory assistant at the lazaretto was bitten by a *C. pipiens*, which was at once killed and found on examination to contain *M. melitensis*. The assistant fell sick of Malta fever eleven days later. On January 29th, 1906, a telegram was received from Captain Kennedy, announcing that he had been successful in transferring the disease to a monkey by means of the mosquito. It is evidently a monkey mentioned in a letter as having been bitten by mosquitoes caught in the nets and wards of the Malta fever patients. It began to react slightly some ten days after the last biting, and had not been in contact with anything likely to infect it. These are the only experiments, up to the present, which

can be called successful, and it is doubtful if any of them are quite free from fallacy. In 1905, this mode of infection was taken up seriously. Horrocks and Kennedy examined the blood found in the stomachs of 896 mosquitoes caught in hospitals, barracks, &c., and recovered the micrococcus from four of them (three *C. pipiens* and one *S. fasciata*). The number of colonies appearing on the plates from the three *C. pipiens* were thirty-four, six and eleven, respectively. Taking 5 cubic millimetres as the ordinary amount of blood sucked in by a mosquito, it would appear that some multiplication of the micro-organism had taken place in the interior of the insects, since never more than one or two micrococci have been found in that quantity of blood by direct examination. Shaw found it once in 4 cubic millimetres, and Gilmour once in 3 cubic millimetres.

In spite of this possible, but very improbable, multiplication of the micro-organisms in the blood contained in the stomach of the mosquito, it is still difficult to understand their transference to a healthy person. It is evidently true that something of the kind occurs in plague, and if it is true that the rat-flea can convey plague bacilli from sick to healthy animals, there is no easily apparent argument why the mosquito should not do the same for the Malta fever micro-organism. But the crucial proof of this transference of Mediterranean fever by the mosquito would be by directly doing it repeatedly by experiment. Horrocks made in all ten experiments with goats and monkeys to try to settle this point, at first on a large scale with a mixture of Culex, Stegomyia, and Acartomyia, and afterwards with the separate species. Shaw also attempted to infect a monkey in this way during a period of two months, and Zammit repeated his former experiment twice. Up to the present, all these experiments have been negative.

It must therefore be concluded that there is, at present, not sufficient proof that Malta fever is conveyed from the sick to the healthy by mosquitoes, but that a case is made out for more experimental work in this direction.

Criticisms and Suggestions.

Epidemiology.

(1) Although it is to be regretted that nothing very definite has been made out as to the mode of infection in Malta fever by the epidemiological study of the disease, yet it is believed that by the continuation of this work, especially by the careful study of

each individual case and its surroundings as soon as it occurs, information will be gained which may in time throw some light on the little-known etiology of this fever.

(2) The question of the evacuation and disinfection of barrack-rooms in which cases occur ought to receive attention.

(3) A more complete isolation of the sick, convalescent and ambulatory cases might also be considered.

(4) In regard to the various animals susceptible to Malta fever, cats, rats and mice might be added to the list.

(5) The incubation period of this fever is important and requires further experiment and observation.

How the Micrococcus Leaves the Body.

(6) It may be accepted that the main paths of exit are the milk, urine and perhaps fæces; the others are negligible. The question of the excretion in human milk may be important.

(7) It is suggested that the micrococci may not be so numerous in goats' milk in winter as in summer, and so account to some extent for the seasonal prevalence.

The Micrococcus Outside the Body.

(8) It seems to be sufficiently proved that this micro-organism can retain its vitality and virulence for long periods outside the body.

(9) If there is any conceivable likelihood of the micrococcus being found in external Nature, in air or dust, this search might be persevered in. Up to the present it has been found outside the body of warm-blooded animals in milk, urine, and the blood contained in the stomach of the mosquito.

How the Micrococcus Gains Entrance to the Body.

(10) The experiments made with monkeys sufficiently prove that Malta fever may be conveyed from the sick to the healthy by intimate contact without the aid of mosquitoes. How the infection is carried is not strictly made out. It may be by way of the urine and contaminated food, and this appears probable enough; and it is also suggested it may be by eating ectoparasites containing the micrococci. Also, in view of the fact that plague bacilli can be carried by the rat-flea, it is further suggested that in intimate contact the flea or louse may play a part.

(11) In regard to dust experiments, it is proved that dust

artificially contaminated by laboratory cultures can carry infection. It is not proved that this takes place under natural conditions.

(12) It is sufficiently proved that Malta fever can be conveyed to animals by way of the alimentary canal. It is suggested that infection by way of the rectal mucous membrane be made the subject of an experiment.

(13) It seems to be proved that Malta fever may be conveyed to man by means of infected goats' milk. This important subject should be followed up in every possible direction. The suggestion that villages served by infected herds suffer more than those served by "clean" herds seems capable of expansion. The question of butter and cheese as carriers of infection ought to be strictly enquired into, as a quantity of local cheese may be consumed by the soldier, and especially in sergeants' Messes.

(14) In regard to biting insects, there is at present no sufficient proof that Malta fever is carried by mosquitoes, but that a case has been made out for more experimental work in this direction.

(15) The two most important lines of work now seem to be the conveyance of infection by biting insects, such as mosquitoes, fleas, ticks, &c., and by goats' milk, or other articles of diet into which milk enters.

Clinical and other Notes.

A CASE OF HYDATID OF THE LUNG.

By Major W. T. Mould.
Royal Army Medical Corps.

Company-Sergeant-Major B., R.G.A., aged 40, service eighteen years, India six years, and previously at home for some years, reported sick on October 28th, about noon. He gave the history of slight hæmoptysis eighteen months before, and he had reported sick at Thobba sixteen months earlier, and was in hospital six days for "coryza," since then he has had fits of coughing at irregular intervals, and each time he had spat up a little blood. In March last he reported sick here after one of these attacks, and was examined by two medical officers, who found nothing wrong with him, and he was told to bring for examination the next lot of blood he brought up, but he has not had an attack since until to-day. He has lost over a stone in weight during the hot weather, and had no appetite, and not been at all well, but had merely thought it the effects of climate.

On the morning of October 28th he went out with the company route-marching, and after going for about three miles he was suddenly attacked with violent pains in the chest and fits of coughing, so that he had to fall out and sit by the roadside. These lasted about a quarter of an hour, with some spitting of blood, until a piece of dense white membrane came up, when they ceased, and he came back to the fort and lay down on his bed. After breakfast the cough recurred with greater severity, until he was obliged to come to the hospital for relief. While waiting to see me the cough came on again, and he brought up a little blood-stained mucus and two more small pieces of membrane. The first he had brought to show me was three inches long and half an inch broad, the other two were roughly an inch square. He was completely exhausted and very nervous, pulse 120, the heart dilated, with the apex beat outside the nipple line; the respirations were 24 per minute. He was given a stimulant and some morphia, and kept quite quiet, and was comfortable in the evening. Before daylight on the 29th he had another fit of coughing and brought up another large piece of membrane, which was followed by a large quantity of an offensive discharge, mixed with blood, which tasted very nasty; it all went on to the floor, so was not preserved. Two more small pieces of membrane were coughed up during the day, and some mucus mixed with blood, and it all had an offensive smell, and after this he had no more of these attacks of coughing.

Examination showed that the patient is a thin, spare man, in poor

condition, whose duties had required no muscular exertion. All his organs were healthy, except as noted below.

The expansion of the chest on inspiration was equal on both sides, as was the measurement. The percussion note over the right lung was good and the breath sounds were well heard. On the left side there was absolute dulness to percussion from the clavicle down to the third interspace, both in front and behind; over the dull area the breath sounds were completely absent, and the vocal resonance and tactile vocal fremitus were absent. The rest of the lung was healthy. The left radial pulse was very much smaller than the right, and hardly perceptible when the arms were held over the head. The heart was considerably dilated, but the sounds were clear, with no murmur or thrill. He had no complaint of pain, except when the coughing came on, nor was there any tenderness.

That there was an intrathoracic growth was evident, and a hydatid was suspected, as the heart and vessels were healthy; there was no pain, no tenderness, no enlarged glands to be detected, and no cachexia. As the membrane was suspicious, I sent it to the Kasauli Institute for examination, and Captain McKendrick, I.M.S., reported, "Laminated cystic membrane with hydatid hooklets," which established the diagnosis.

The course of the case was continuous progress; for a few days he had a slight cough, chiefly in the early morning, and spat up some mucus, partly blood-stained, but it daily became less, and ceased in a week. The heart soon resumed a normal size, and on November 1st the beats were 78 per minute, and the apex beat was an inch inside the nipple line. On the fifth day after admission the pulses were noted as practically equal, except when held over his head. The dulness disappeared and the breath sounds returned in the course of a fortnight, except for a small dull patch just at the outer end of the clavicle, about an inch by two in area, and he went up in weight from 9 stone 7 lb. on October 29th to 10 stone 1 lb. on November 24th, when he was discharged.

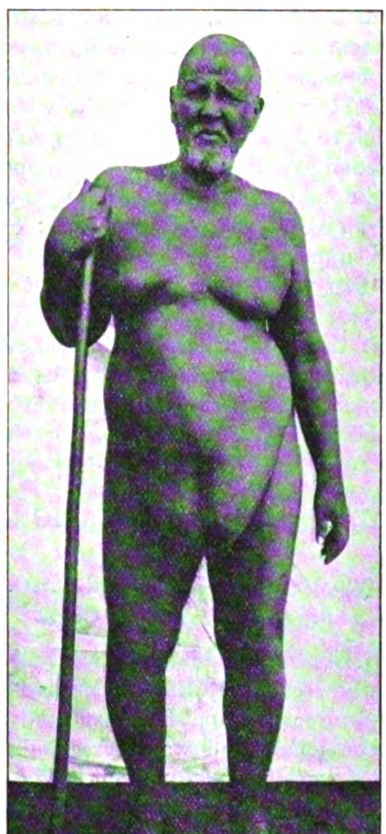
The treatment was absolute rest at first, and a gradual resumption of ordinary habits, with a linctus to relieve the cough, and creasote inhalations.

He has reported weekly since, and is now quite well, and has gone up in weight to 10 stone 7 lb. He has vague pains in the chest referred to round the nipple, but would not have mentioned them if not asked. The pulses are quite equal, and the lungs show no change, except that the dull patch is still found at the outer end of the clavicle.

A CURIOUS CASE OF LIPOMA, NOT UNCOMMON IN THE EGYPTIAN SUDAN, TAKING THE FORM OF AN APRON-LIKE FOLD EXTENDING AS FAR AS THE MIDDLE OF THE THIGHS.

By J. B. CHRISTOPHERSON, M.A., M.D., M.R.C.P., F.R.C.S.
Senior Medical Inspector, Sudan Government.

WAD RAGAB, aged 65 approximately, an Arab Sheik coming from near Berber, weight 17½ stone, height 5 feet 6 inches, with his back arched and suffering from evident discomfort, could with difficulty waddle along with



his staff owing to the weight of a mass of fat in his abdominal parietes. The skin hung down from the umbilicus to the middle of the thigh like a bag, enclosing a mass of fat, and behind becoming continuous with the abdominal skin again over the pubis.

This fatty apron could be flapped up towards the chest, and buried deeply in the folds of fat and behind it was the penis, retracted and hidden.

The photograph gives a somewhat false topographical idea on account of the umbilicus being at least 4 inches above the depression depicted. The umbilicus, of course, should be, and was, about on a level with the highest points of the iliac crests, or, with the arms hanging down by the side, on a level with the bend of the elbow.

His limbs had a fair covering of fat, and the breasts were very pendulous, but there was not much fat about the head and neck.

The history given was that several years ago he contracted syphilis, and he journeyed from Berber to Khartoum for treatment, where a native doctor gave him sarsaparilla for twenty-one days, and after his return to Berber his appetite became so great that he could eat at breakfast a quarter of a sheep. This statement he stuck to when the truth of it was challenged, and I think that his state was really due to an over-indulgence in animal food and sedentary habits. The fatty deposit in the abdominal parietes became pendulous and apron-like, because there was no support such as cloth trousers give to the Western race; calico garments, loose as they are, afford no support.

I amputated the flap with eight pounds of fat under chloroform by means of two transverse incisions extending across the abdomen. The result was successful; the physical obstruction caused by the flap being removed, and hospital *regime* having reduced the old man generally in weight, he left the hospital very pleased with the result.

This occurred in May, 1905.

A CASE OF RADICAL CURE OPERATION FOR HERNIA IN A CHILD.

By Captain R. H. FUHR, D.S.O.
Royal Army Medical Corps.

Child F. L., 2nd Gordon Highlanders, aged 2¼ years, was admitted to the Station Family Hospital, Cliffden, Murree Hills, on May 25th, 1904, suffering from a direct inguinal hernia on the right side. This had occurred two years previously and was increasing, being at the time of examination about the size of a large walnut. The child had also a long and constricted prepuce. Circumcision and radical cure were performed under the one administration of chloroform.

The external abdominal ring was exposed at the junction of the lower and middle thirds of the wound, the sac freed, and the intestine returned. The thin transparent sac was pulled down slightly, two circular twists given to the neck, and folded as in MacEwen's operation. A slightly curved needle, threaded with silk-worm gut, was pushed through the sac

folds, and carefully passed along the little finger up the canal to the internal abdominal opening, where it was made to pierce the tissues on the outer side through to the skin, and brought out through the skin and unthreaded. The wound end of this suture was now threaded and brought out in a similar manner through the inner side and skin. The ends were gently pulled upon, causing the mass of sac tissue to fit like a pad on the internal opening, and tied.

The wound was closed in the ordinary way, no interference by sutures with the internal opening being made. The dressings were removed on the tenth day, union was excellent, and the stitches were removed, including the long pad suture. A pad and bandage were worn for a couple of months, when the child was quite cured.

This case has been seen a year after the operation, and recovery has been absolutely perfect.

COMMENTS.

(1) I can find no description of such a suture in any text-book, but am informed that Dr. Neave, of Kashmir, has used it.

(2) No buried sutures are left, which is a distinct advantage.

(3) The canal is not interfered with, so that there can be no neuralgia of the cord.

(4) The operation is easily done, devoid of risk, and apparently suitable for a young child, and sufficient to cure.

A CASE OF SALPINGITIS OF LEFT TUBE; VENTRAL CŒLIOTOMY, INCISION, DRAINAGE, AND RECOVERY.

By CAPTAIN R. H. FUHR, D.S.O.
Royal Army Medical Corps.

MRS. D., Queen's Regiment, a primipara, was confined on July 4th, 1904, in the Station Family Hospital, Cliffden, Murree Hills.

Her confinement, at which I was not present, is reported to have been prolonged, with prolapse of vaginal wall during the second stage of labour. Placenta healthy and delivered entire. Child—a large, well-developed female.

On July 9th, slight pyrexia and quickening of the pulse rate occurred. The lochia, however, were normal. On July 11th, the microscopical report of Major B. H. Scott, R.A.M.C., on two blood films, was a marked leucocytosis, with large increase of polymorphonuclears. The uterine discharges became scanty and slightly offensive, and an examination by Major Scott revealed the presence of staphylococci and streptococci. Anti-streptoccic serum was injected on two occasions, and repeated intra-uterine douches given.

On July 24th, no improvement having taken place, and bimanual

examination having revealed a hard swelling in Douglas' pouch, operative treatment was decided upon.

On July 25th, having given a thorough intra-uterine douche, and swabbed out the uterus with iodised phenol, I performed a ventral cœliotomy. On opening the abdomen the uterus was found to be bound down by adhesions, which took a considerable time to break down. The left tube was swollen and enlarged, also slightly prolapsed into Douglas' pouch. I incised the swelling and removed about half an ounce of pus with dry swabs, taking care to mop up the discharges, so that none escaped into the peritoneal cavity. Next Douglas' pouch was swabbed out with dry pads, a drainage tube inserted in my incision into the tube, and firmly fixed. The abdomen was closed, the uterus being freed from adhesions, and in good position. Recovery was steady, and by means of a fine rubber tube attached to a metal syringe, and inserted into the drainage tube, I was able to remove the pus which collected in the diseased left tube. In a few days the drainage tube was removed and the wound closed. I have since seen this patient, who is in excellent health.

COMMENTS.

(1) It is rare to find such a case, which was evidently the result of sepsis, unilateral.

(2) The diagnosis was obscured by the gradual onset and slight physical signs, the pyrexia being moderate, and the abdominal tenderness being slight.

(3) Anti-streptococcic serum was useless.

(4) Recovery was uninterrupted, although the tube was not removed. No discomfort or pain occurred at subsequent menstruations for, at any rate, six months (the last date I saw my patient).

(5) The patient was operated on in a small "bunk," on an ordinary table; no raising to the Trendelenburg position was possible; the lithotomy position was with difficulty maintained by a bandage passed under the neck, and an ordinary rubber drainage tube alone was available.

(6) Antisepsis was secured by washing the floor of the "bunk" with perchloride solution, and steaming the room with carbolic solution in a bronchitis kettle for two hours previous to the operation.

Reprint.

THE NEW GERMAN RIFLE BULLET.

Two of the most important properties which a military rifle can possess are great ranging power and a flat trajectory.

These properties depend mainly on two factors, high muzzle velocity and high sectional density, *i.e.*, a high ratio between weight and cross-section of bullet. A third factor is the shape of the bullet, more particularly the shape of the head, by which the resistance of the air is considerably modified.

Considerations of recoil, weight of rifle, &c., make a heavy bullet incompatible with high muzzle velocity, and in order to keep the sectional density as high as possible, it has been found necessary, as the evolution of the rifle has progressed, to reduce the diameter of the bullet as well as to reduce its weight. In modern military rifles the diameter of the bullet varies between 0·32 and 0·26 inch, the corresponding weight of bullet being from 244 to 163 grains.

The German military authorities have been experimenting for some time past with a view to increase the muzzle velocity of their rifle to approximately 3,000 feet per second, in order to ensure the flattest possible trajectory at decisive ranges, a consideration which they regard as of primary importance.

There were obvious objections to doing this by reducing the calibre of their rifle from 0·311 to 0·256 (or some smaller calibre), which would be the first method to suggest itself. Apart from the great cost involved in such a change, there are certain objections to a very small bore, *per se*, viz., diminished wounding power and increased difficulty of cleaning and keeping in order the interior of the barrel.

The alternative solution was to improve the ballistics of the existing rifle by a suitable modification of its ammunition, and it appears, from a recent article in the *Kriegstechnische Zeitschrift* (1905, Heft 9) that this has been effected partly by the adoption of a more powerful charge (whether a new powder is involved is not quite clear), but mainly by the adoption of a new bullet, known, on account of its pointed shape, as the Spitze-geschoss, or " S " bullet.

This bullet (a sketch of the reported shape of which, together with further details, is appended) weighs only 154·3 grains as against the 227 grains of its predecessor, or as against the 215 grains of our Lee-Enfield bullet.

This reduction of 73 grains weight, coupled with the higher pressure given by the new charge, has apparently raised the muzzle velocity of the German Mauser from about 2,090 f.s. to about 2,900 f.s.

An additional and by no means unimportant advantage secured by the reduction in weight of the bullet is that about 15 per cent. more ammunition can be carried than heretofore.

It will be seen that in designing their new bullet the Germans have

deliberately departed from the principle, hitherto considered essential, of a high sectional density.

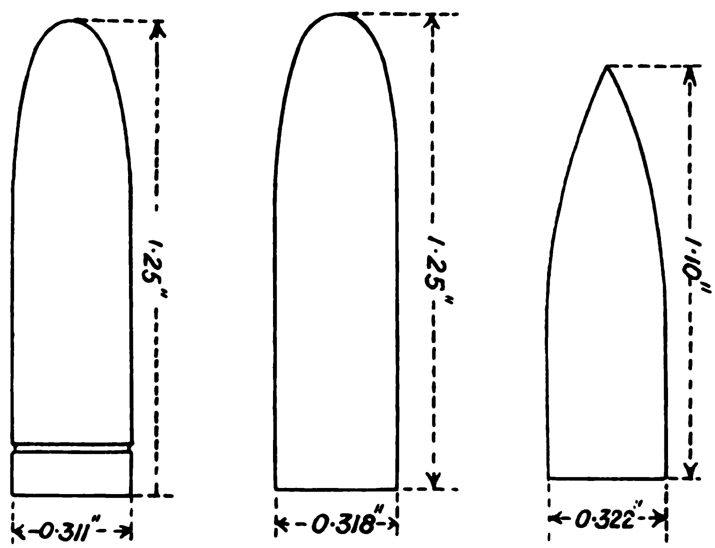
Assuming, however, the correctness of the published data, it is evident that this low sectional density has been compensated for by the altered shape of the new German bullet, which gives rise to a very much lower air resistance than has hitherto been considered possible at normal atmospheric temperature and pressure.

The importance of the alteration in form may be gauged by the fact that had the normal shape been retained, the remaining velocity of the bullet at about 1,000 yards would have been no greater than that of our bullet, which starts at 800 f.s. lower velocity, while beyond 1,000 yards the heavier bullet would have travelled faster.

British and German Rifle Bullets.

Scale $\frac{4}{1}$.

Great Britain. Weight, 215 grains.	*Germany*, 1888-1905. Weight, 227 grains.	*Germany*, 1905.* (Reported shape of "S" bullet.) Weight, 154·3 grains.



All three bullets have lead cores, the British bullet having a cupro-nickel jacket, the jackets of the two German bullets being of nickel-plated steel.

* See drawing in *Kriegstechnische Zeitschrift*, Heft 10, Jahrgang viii.

As it is, the "S" bullet maintains its superiority in velocity at practically all ranges. Whether it compares favourably with the heavier bullet in accuracy is, however, doubtful.

The greatest advantage given by the "S" bullet in the matter of flatness of trajectory is to be found between 500 and 800 yards. At 700 yards range a man 5 feet 9 inches in height would be hit anywhere

RANGE TABLES.*

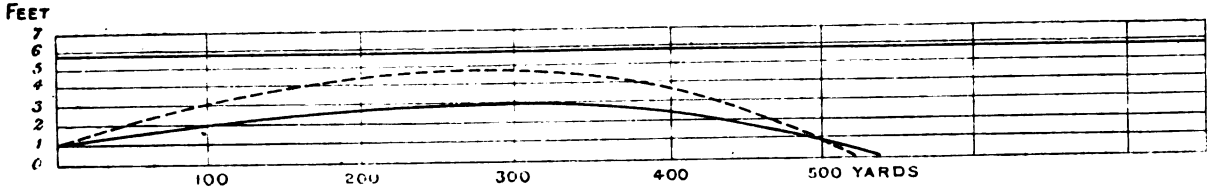
Range	Lee-Enfield. "C" = 0·411. "S" Bullet. "C" = 0·40.											
	Angle of projection		Time of flight		Remaining velocity		Striking energy		Maximum height attained		Angle of descent	
	L.E.	"S."	L.E.	"S."	L.E.	"S."	L.E.	"S."	L.E.	"S."	L.E.	"S."
Yards	Degs. Mins.	Degs. Mins.	Secs.	Secs.	Ft.-secs.	Ft.-secs.	Ft.-lb.	Ft.-lb.	Feet	Feet	Degs. Mins.	Degs. Mins.
0	0 0	0 0	0	0	2,060	2,909	2,036	2,916	0	0	0 0	0 0
200	9	4½	0·32	0·23	1,673	2,355	1,343	1,910	0·4	0·2	11	5
400	21	10¼	0·72	0·52	1,361	1,900	889	1,244	2·1	1·1	28	14½
500	29	14¼	0·95	0·68	1,229	1,712	724	1,009	3·6	1·9	40	21
600	37½	18½	1·21	0·87	1,119	1,538	600	814	5·8	3·0	55	28½
800	59	28¾	1·78	1·30	981	1,239	461	529	13·3	6·8	1 36	53
1,000	1 25	45¼	2·43	1·83	886	1,039	377	371	24·9	14·0	2 25	1 30
1,200	1 58	1 5½	3·14	2·44	807	930	313	298	42·2	25·2	3 26	2 19
1,500	2 56½	1 46	4·33	3·50	708	803	240	222	83·5	53·5	5 22	3 53
2,000	5 8	3 21½	6·70	5·60	569	642	155	142	198·0	141·0	9 56	7 39

* The "S" table has been calculated upon the basis of the article in the *Kriegstechnische Zeitschrift.*

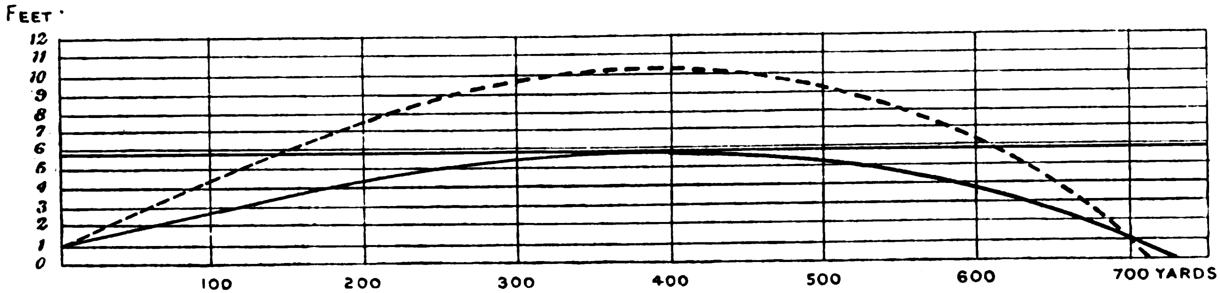
Similar tables, based upon slightly different data, have appeared in the *Field* of December 16th last, and in the January number of *Arms and Explosives.*

Trajectories of Lee-Enfield and "S" Bullets at 500, 700, and 800 Yards, Muzzles 1 Foot from Ground.

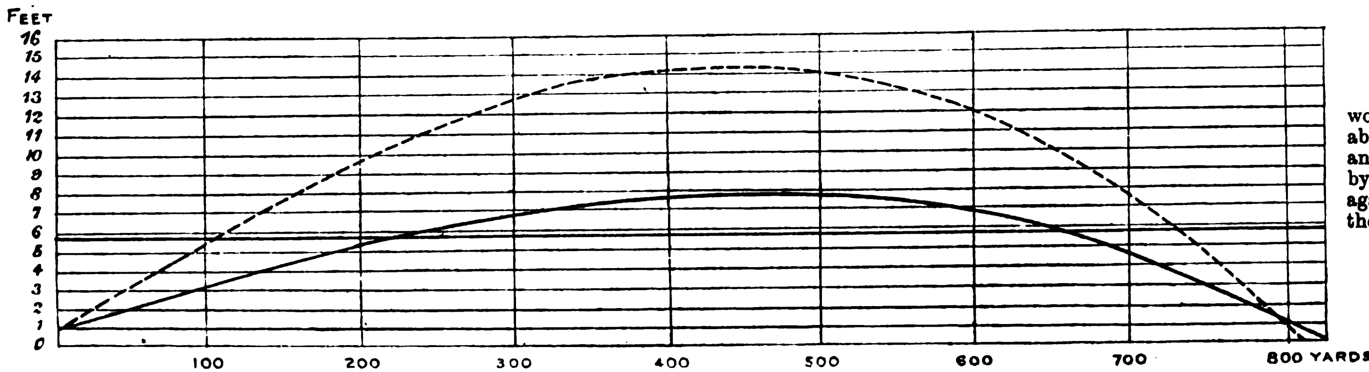
L.E. (upper) - - - -   "S" (lower) ———



A standing man, 5 feet 9 inches in height, would be hit by either bullet at 500 yards.



The same man would be hit by the "S" bullet over the entire range of 700 yards, while with the present Lee-Enfield bullet he would only be hit over about 250 yards.



The same man would be hit over about 350 yards of an 800 yards range by the "S" bullet, as against about 180 with the Lee-Enfield.

along the range if the muzzle of the rifle were 12 inches from the ground, the sights set at 700 yards, and the ground-line aimed at. The same effect would only be produced with our present Service rifle at about 550 yards.

Without experimental data it is difficult to estimate exactly the energy of recoil of a 9-lb. rifle with a muzzle velocity of 2,900 f.s. and a 154-grain bullet, but it would appear to be well below the limit of 15 ft.-lb., which is the maximum desirable in a military rifle.

Two further questions affecting the military value of the new bullet arise: its wounding power, and its penetration.

Taking the striking energy of the bullet as the measure of its wounding power, it would seem that the new bullet is more effective than the Lee-Enfield up to between 900 and 1,000 yards; beyond that range it is slightly inferior, but the difference is not marked.

Apart from its superior striking energy, however, the so-called explosive effect characteristic of modern high-velocity bullets at close ranges would probably be occasioned by the "S" bullet at very much greater ranges than is at present the case; possibly up to 600 or 700 yards, as against 200 or 300 with the present bullet. Experiments, however, would be necessary to test this point.

As regards penetration, the advantage must lie with the new bullet at all except extreme ranges.

Diagrams of the new and old German bullets, and of our 0·303 bullet, together with comparative ballistic tables and diagrams of trajectories, are appended.

Translation.

THE MEDICAL SERVICE OF THE ITALIAN ARMY.

(*Continued from p.* 188.)

SANITARY SERVICE IN THE FIELD.

I.—*Army Organisation.*

Troops.—On a war footing the Italian Army presents the following:—

	Active Army	Mobile Militia	Territorial Militia	
Infantry and Customs Corps ..	347	175	324	Battalions.
Alpine Corps	75	38	75	Companies.
Cavalry	144	—	—	Squadrons.
Field Artillery	186	63	—	Batteries.
Mountain Artillery	15	15	—	,,
Fortress Artillery	78	—	100	,,
Military Train	40	24	—	Companies.
Engineers..	74	54	30	,,
Sanitary Corps	12	12	12	,,
Commissariat Corps	12	12	12	,,
Trained men	825,000	305,000	702,000 = 1,832,000.	

The troops of the active Army form 4 armies of 12 army corps and 3 independent cavalry divisions. Besides these, 12 divisions of mobile militia would be constituted.

The composition of an Army Corps is given as 2 infantry divisions, each of 12 battalions, 8 batteries in two groups, one sanitary and one commissariat section. In addition as supplementaries 1 regiment of Bersaglieri, 1 of cavalry, 1 battery of artillery, 1 company of sappers, 1 sanitary section and 1 of commissariat. The Alpine companies and batteries do not form part of Army Corps, but are intended to cover the mobilisation of the Army by defending the land frontier.

Each infantry regiment has 77 officers and 3,116 men divided into three battalions. The Alpine companies consist of 6 officers, 250 rifles and 43 guides (*conducteurs*); cavalry squadrons consist of 5 officers and 134 troopers, batteries of field artillery 4 officers and 124 to 162 men, horse artillery 4 officers and 150, and mountain artillery 6 officers and 280 men.

An Italian Army Corps has directly attached to it 1,100 vehicles, of which 45 are for the sanitary service.

II.—*Administrative Service, Sanitary Department.*

It is recognised in the Italian Army that military administration forms one of the most important functions of commanders, and that it can only be confided to them.

Under the title "Intendance of the Army" (Quartermaster-General's Department?) the direction of the administrative services and of the lines of communication are entrusted to a combatant General Officer, who is directly responsible to the Commander-in-Chief, and who is assisted by a staff composed of officers of the Staff Corps and officers of the different branches of the Army. The Intendance of the Army controls the following: (1) transport; (2) depôts; (3) sanitary service and hospitals; (4) commissariat; (5) veterinary service.

Medical Organisation.—In the field the Sanitary Service is directed through (1) the Surgeon-General attached to the "Intendance-General of the Army"; (2) Directors of the Sanitary Service of the Army; (3) Directors of the Sanitary Service of Army Corps; (4) Principal Medical Officers of divisions; (5) delegates from Red Cross Societies, but only for internal discipline and administration.

The direction of the Sanitary Service of the Army and the delegates of societies are under the control of the Intendant-General of the Army. In Army Corps and Divisions the Chief Directors are under the control of the Chief of Staff of the unit to which they belong, and must carry out his orders in preference to those of the Sanitary Director of the Army, in which case he must report the fact to the latter. The Sanitary Directors of the Army and of Army Corps communicate with one another on questions affecting removal of the sick or on purely technical questions, and in urgent circumstances have the right of initiative.

The Surgeon-General attached to the Intendance of the Army is the technical adviser of the Intendant-General. He is in touch directly on the one hand with the Chief Inspector of the Sanitary Service, and on the other with the Sanitary Directors of the armies on all questions of a purely medical nature.

The Army Sanitary Director is responsible to the Intendant-General for the proper working of the Sanitary Service, and must submit to the Intendant-General all proposals referring to medical *personnel* and materials, the treatment and removal of sick and wounded, the employment of field hospitals or local ones, the hospitals on lines of communication, the organisation of convoys, trains and hospital boats and ships, the strict application of hygiene, and especially the sanitation of battlefields. In urgent conditions he initiates indispensable measures.

Sanitary Directors of Army Corps are subordinate to the Sanitary Directors of armies, and control the Divisional Medical Officers. They personally direct the medical attendance on the supplementary troops, and dispose of the Sanitary Section belonging to the Army Corps to reinforce, in case of need, the Divisional Sanitary Sections. They employ for the same purpose the field hospitals placed at their disposal by the Sanitary Director of the Army.

When fighting occurs they control the Sanitary Service of the Army Corps, co-ordinating the actions of its constituent sanitary companies.

They keep in touch with the General of the Army Corps and the Surgeon of the Army. They make returns of the losses occurring during military operations, and issue the necessary requisitions to hasten the collection and treatment of the wounded and ultimately their evacuation.

The Divisional Surgeon exercises the same functions as the Sanitary Director of Army Corps in connection with a division. During marches he is in close attendance on the General; in the field he remains near the Sanitary Section in order to supervise its action and to establish a proper relationship between the dressing stations (*posti di medicazione*), the Sanitary Section and the Field Hospitals allocated to the division. He has to enforce stringent attention to sanitary conditions in the localities occupied by troops, attend to the collection of wounded on the battle-field by means of the *personnel* of the regimental bearers and the Sanitary Section, and see that materials for the treatment of wounded are properly supplied.

Organisations of the Sanitary Department.—In the first line: (*a*) Regimental Surgeons and equipment; (*b*) sanitary formations proper, consisting of the Sanitary Sections, Field Hospitals and Temporary Infirmaries. In the second line—lines of communication; (*c*) Field Hospitals, Hospitals of Voluntary Associations, which are called War Hospitals (*ospedali da guerra*), and all other permanent and temporary hospitals, whether civil or military. Infirmaries on the lines of communication, all methods of transportation, such as convoys or trains organised for war purposes, store depôts, and last of all, reserve sanitary establishments.

The organisation of these rests with the directors of the principal hospitals with the headquarters of the Army. Men on leave and of the mobile militia are called in to complete the *personnel*, whilst the men of the territorial militia are by preference sent to fortresses and to the territorial units.

Waggons and material are provided and horsed by the supply companies of the field artillery.

Vehicles for field hospitals are horsed by the civil transport. Each Army has twenty-four field hospitals, nine of which alone are packed on wheeled transport and supplied with horses. The material required is in charge of the military authorities told off for the purpose.

III.—*Regimental Organisation and Material.*

Each infantry regiment of three battalions has 1 Captain-Surgeon and 6 Subaltern-Surgeons, 3 Infirmary Corporals and 24 stretcher-bearers.

Each cavalry regiment of six squadrons has 3 Surgeons. Each group of four batteries of artillery, of 2 or 3 companies of sappers, of an artillery park have only 1 Surgeon.

Every soldier carries a first field dressing [two pads of absorbent muslin, and an absorbent bandage treated with bichloride, two nickeled pins. The package is covered with parchment paper and enclosed in an

outer covering of waterproof cotton. Size, 0·065 × 0·06 × 0·015 ($2\frac{3}{5}$ × $2\frac{2}{5}$ × $\frac{3}{5}$ inches). These packets are kept in the regimental stores, and are served out on mobilisation fitting into a pocket of the service jacket.

The stretcher-bearers have a pouch with dressings (*tasca di sanita*), the Sanitary Aide Corporal carries a sack of dressings (*zaino*), and in the cavalry a pair of wallets.

One of the battalion waggons, called sanitary waggon (*caretta di sanita*), carries a couple of cases (*cofani*), containing medicines and dressing materials for each battalion, and besides this there are 6 stretchers (*barelle*), model 1897, and a barrel of 50 litres for water.

	Sanitary Organisations						Sanitary Train
	Sanitary Sections			Field Hospitals			
	Infantry	Cavalry	Mountain	200 Beds	100 Beds	Mountain	
Surgeons	6	2	6	7	3	2	4
Pharmacists	—	—	—	1	1	1	—
Accountants	2	1	1	1	1	1	—
Paymaster	1	1	1	1	1	—	—
Non-Com. Officers ..	6	2	6	3	2	2	2
Sanitary Aides.. ..	8	3	8	8	3	2	5
Infirmarists	14	4	14	20	10	7	35
Bearers	184	21	184	15	7	3	—
Train: Officers ..	1	—	—	—	—	—	—
Train: Men ..	28	16	51	11	6	35	—
Train: Orderlies ..	10	4	8	10	6	4	—
Ambulance waggons..	8 } 15	4	8 } 15				
Store waggons.. ..	4 } 15	1	4 } 15	9	5	—	—
Battalion waggons ..	3 } 15	4	3 } 15				
Horses	30	12	32	24	13	2	—
Mules	—	—	22	—	—	25	—

The ambulance waggons can carry 6 men sitting and reclining, or two on stretchers and three sitting (*sic*). In a box under the driver's seat are some provisions and ambulance stores. Eight closed stretchers are also carried in the imperial.

Stores are carried in four waggons; two four-wheeled, the remainder two-wheeled, the latter for difficult places (*carri and carretta di sanita*). Food, the operating tent, a pair of medicine cases and 40 pouches of dressings are carried on the 3 battalion waggons together with 24 stretchers, besides 4 on the store waggons. There are altogether 94 stretchers per section.

The Sanitary Section attached to infantry can be divided into two halves. The cavalry section is equal to half a section; its material is carried on a four-wheeled waggon.

Mountain Section.—Formed on the same plan as that of the infantry section; it has, however, mules in addition, and folding stretchers.

Field Hospitals.—These vary in size for 50, 100 or 200 patients.

Their beds and materials are carried in requisitioned waggons driven in rear of troops by either the artillery train or civil transport. The small hospitals of 50 beds can be attached to mountain troops and be packed on mules and are then called *ospedaletti somegiatti* (portable). The stores for a hospital of 100 beds can be carried on 4 requisitioned waggons. An omnibus attached carries the medical officers who are not mounted.

At the time of mobilisation the Sanitary Service must consist of the following:—

(1) The Directing Councils of Armies and Army Corps.

(2) In each Army Corps one Sanitary Section for the supplementary troops, one section for each infantry division and one for each cavalry division.

(3) A certain number of Field Hospitals (five per Army Corps) and Mountain Hospitals.

(4) Detachments required for fortified places and for lines of communication.

Utilisation of the Subdivisions of the Sanitary Organisation.

Regimental Arrangements.—With troops the Surgeons carry on their daily routine of duty, as in peace. They keep their stores replenished, attend the sick, and according to the gravity of the cases, send them either to the organised infirmaries or to the hospitals, with or without the intermediation of the Sanitary Sections. When troops become stationary, infirmaries are established, either with the regimental material and *personnel*, or with that of the Sanitary Section as the Sanitary Director of the Army Corps may direct, or by order of the officers in command of troops.

In action infantry regiments or isolated battalions may, by order of the Commanding Officer, form collecting (dressing?) stations (*posti di medicazione*) in rear of, but sufficiently near, the fighting line, so that the wounded can be most easily and promptly taken on the stretchers, scattering them sufficiently to protect them from the heaviest fire, and so as to place them out of sight of the combatants. Cavalry do not establish such posts, artillery and sappers only exceptionally; the Medical Officers belonging to these give their services in the nearest collecting stations and ambulances. The duties of the Medical Officer in these field stations consist in collecting the wounded, irrespective of nationality, within their zone of action, to dress their wounds, decide whether they shall be placed in the ambulances, or direct them to a field hospital, or send them back to their units after being dressed, or to see that they are separate from the living in case of fatal issue. Only the most urgent operations may be performed by them.

The stretcher-bearers carry out their duties under the Sanitary Aides controlled by the Regimental Surgeons. Before returning to the firing

line they refill their bags of dressings and water-bottles. They are also employed to load the ambulance waggons, and when fighting ceases to bury the dead.

The Surgeons employ, in the first instance, the first field dressing, carried by the soldiers; attach tallies with the nature of the wound, red for those cases that will not bear transportation and white for the others.

They must always keep touch with their regiments and follow them, advancing or retiring, after having caused the removal of the wounded or after leaving with them the number of attendants strictly necessary to look after them. They send returns every two days to the Divisional Surgeon, and on the days upon which engagements occur, a list of wounded in the corps to which they are attached. In the cavalry the Surgeon may, with the consent of the Commanding Officer, employ such soldiers as stretcher-bearers as have had the neccessary training. When several Alpine Companies are united for a fight, only one collecting station is formed under the Senior Medical Officer. Here urgent operations may be performed if other aid is too distant.

Sanitary Section.—The Sanitary Section is intended to reinforce the regimental sanitary organisations, and serves as a connecting link between them and the field or other hospitals. It renews the medical supplies of the former when exhausted, drawing its own from the Army Directors of the Army Corps. Commanded by the Surgeon senior in rank, it can be subdivided into half-sections, Nos. 1 and 2.

On the march it takes its place where ordered, usually in rear of the main column; the men are on foot and march behind or alongside the waggons. No soldier may ride in the waggons unless furnished with a permit signed by a Surgeon of the corps and by the Chief Surgeon of the section. Having reached the halting place, those fit for duty return to their units or they are sent to hospitals.

Each morning the combatant units send men, who are unable to march, to the Sanitary Section. The Surgeon in command determines whether these are to return to their units, or are to be evacuated to hospital. A convoy of carts is requisitioned by the Director or by themselves when urgent. The sick of an Army Corps are kept together in one convoy under the orders of a non-commissioned officer, or, if necessary, of a surgeon, who rejoins his column when his duty has been accomplished.

During an engagement the Section installs itself in an assigned or a chosen position as a whole or half-section, since the aim is, if possible, to keep a half-section available for other duty. The spot chosen should be protected from the fire of the enemy, out of the way of troops whose movements it must not impede, and close enough to the collecting stations to save the wounded from being transported long distances, preferably in a village or in a factory, or in a spot well supplied with water and near means of communication. The tent is pitched if necessary.

The bearers fetch the wounded from the collecting stations under non-commissioned officers.

The officers divide themselves into three groups for receiving, operating upon and dressing the wounded.

The Accountants, assisted by their non-commissioned officers, carry on the correspondence, fill in tallies and pocket books, make entries of the sick, note medical and other directions, receive the valuables of the soldiers, make wills, and finally look after the feeding of the patients and of the *personnel* of the company.

The weapons of the wounded are placed in the waggons in which the wounded are evacuated to the hospitals in the rear. Since the sections are to follow and keep touch with the units to which they are attached, they must liberate themselves as soon as possible. This they are authorised to do in one of the three following ways: (1) by placing their wounded in Field Hospitals, War Hospitals, Civil Hospitals, or in the houses of the neighbourhood; (2) in the event of a retreat, leaving the most serious cases under the protection of the Geneva Red Cross, and with the wounded only the strictly indispensable attendants and stores; (3) by evacuating them preferably by requisitioned waggons or by rail to the nearest Field Hospital, or to such shelter as may be indicated by a Sanitary Director.

In case of necessity the military police (*gendarmerie*) of the Army Corps or Division will forcibly requisition transport, and the military authorities will give free passage to convoys of wounded, preference only being given to troops marching to the front.

During temporary cessations of hostilities or an armistice the *personnel* of the Sanitary Corps can escort convoys; they also lend assistance on burial parties with neighbouring troops and the inhabitants requisitioned for the purpose.

Field Hospitals.—Being organisations of the Army they are placed under the Army Sanitary Director, unless they be detached and placed at the disposal and under the orders of Regimental or Divisional Surgeons. They are to be effectually movable hospitals with full medical supplies, and intended to follow the troops and receive and treat the wounded. Hence the regulations prescribe their being set up close to the field of battle and as near as possible to the Sanitary Sections, so that they may not only relieve the latter of their patients, but also receive wounded directly from the collecting stations and from the field.

Preferably they are located close to a railway station accessible to the wheeled transport; tents or huts are erected. The hospitals carry 50, 100, or 200 beds, but these numbers do not limit their maximum number of beds, and if local accommodation is sufficient they may be considerably increased in size. They are installed according to the orders of the Intendant-Generals through the Sanitary Directors.

On the march they follow in the rear at such a distance as will enable them to come on the field of action the same day. In the event of there being a great number of wounded, the hospitals are concentrated when

required, and even War Hospitals may be thus employed. The men of these organisations may even be sent in advance of their equipment in order to reinforce the units already engaged, and if possible to guarantee wheel-transport for the conveyance of the wounded. As soon as the hospital is installed, the fact is reported to the Sanitary Directors.

The Principal Medical Officer must in the first place avail himself of all the materials he can obtain locally, in order to keep in reserve in his waggons the greater part of his supplies. A rapid evacuation of the field hospitals, either by transferring to neighbouring hospitals or sending to the base, is to be essentially borne in mind. The Army Sanitary Director has to apply to the Intendant-General that orders may be issued for the collection of transport and the rapid despatch of convoys.

In case of retreat the necessary sacrifices of material, &c., are to be reduced to a minimum. A Field Hospital ordered to take over another already occupied will pass over to the outgoing hospital stores equivalent to those which the latter has to leave behind. Each patient is provided with an "observation" sheet (medical history), which accompanies him if he be evacuated to another hospital. A daily return in duplicate, one for the Director, the other for the military authorities, and a monthly State are drawn up by the Principal Medical Officer. To this, at the termination of the campaign, is added a register of the patients.

Isolation hospitals (yellow flag) are set up for infectious diseases. Access to these is forbidden to the troops, and stringent measures of disinfection are carried out to prevent any spread of diseases.

Lines of Communication, Second Line.—The Intendant-General of the Army has the supreme direction of the organisation of the lines of communication, which exist for the purpose of connecting the active army in the field with its bases of supplies, and with the points of evacuation. This service is carried out by rail and by road to the headquarters of the army, that is, between the two points, the head and base of the lines of communication.

In order that the multiple requirements of the army in the field may be supplied, technical representatives of all the administrative services are congregated at the Headquarter Staff of the Intendant, and are divided into sections according to the particular nature of their functions. (The author draws particular attention to the fact that the Surgeon who commands the Sanitary Section of the Intendants' department is only an executive agent entirely subordinate to the Intendant-General or his Chief of Staff, and that he does not enjoy any autonomy.)

The authority of the Intendant extends to all the sanitary establishments of the second line; it extends also partially to the Reserve Hospitals, which are situated on the national territory, since he can dispose of them for the purposes of evacuation of the army.

The establishments of the second line are intended, some for the treatment of the *personnel* of the Army, and others for the renewal of material supplies.

The establishments of the second line intended for the accommodation of the sick and their evacuation are : (1) Field Hospitals, which have not been attached to Army Corps. Packed on waggons, they follow the troops one or two stages in rear of the columns, so that they may rapidly replace the hospitals in advance ; (2) Evacuation Hospitals, War Hospitals of Red Cross Associations, Country Hospitals and the sanitary organisation set up on the lines of communication ; (3) the Infirmaries of stations on the lines of communication named *posto di soccorso*. These formations are organised by means of the *personnel* and supplies of the sanitary service, or through the Red Cross Society. Their object is to assist such sick as only require temporary assistance, assist and dress the sick of convoys, to take in those too ill to go further, and generally play the part of the French railway station military dispensaries.

As means of transportation, in addition to the ordinary convoys made up of waggons permanently attached to the Intendance and temporarily available, or of requisitioned waggons, there are :—

(1) Sanitary railway trains, of which there are three varieties :—

(*a*) Ordinary trains (*treni provisori*) of goods or passenger waggons, which, after carrying troops to the front, are returning empty.

(*b*) Improvised trains (*treni attrezzati*), which consist of thirty-five goods waggons, each with eight suspended stretchers.

(*c*) Hospital trains (*treni ospedali*), organised and manned by Red Cross Societies and the Order of St. John of Malta. The latter will carry 200 wounded in trucks, and there is a staff of 39, consisting of four surgeons, thirty-four attendants and one cook.

(2) Transportation by water, hospital ships or river ambulances. The Red Cross Association has organised, on lines similar to those of the hospital trains, two hospital ships and two river hospitals.

In order to renew the sanitary supplies at the front, field store and reserve stores have been organised. The latter placed in the home territory are under the Minister of War. The field stores are administered by the Army Intendance and consist of advanced depôts (*deposito avanzato*), and central depôts (*deposito centrale*). As necessity demands, a series of advanced depôts can be echeloned to the front.

To prevent or check epidemics the Italian regulations arrange for the establishment along the lines of communication of disinfecting stations. Their location is fixed during peace by the Inspectors of the Sanitary Service, but the Sanitary Directors of the army have full powers to modify the arrangements according to circumstances. Furthermore, all the Directors are Commanding Officers of troops or of fortresses, &c., and are required to ensure means of disinfection and conservation which may be suggested by circumstances or which may be proposed by the Surgeons. The disinfection of battlefields is carried out under the direction of the Army Intendance.

IV.—*Societies for the Aid of Sick and Wounded in War.*

In 1864, Italy adopted the Geneva Convention. Numerous committees were formed in the principal city as soon as the national unity was established and they united into the Italian Red Cross Association.

The military regulations recognise in addition to this Association the Italian Knights of the Order of Malta.

Italian Red Cross Association.—This Society was publicly recognised by law on March 30th, 1882.

It is admitted to take part in the Sanitary Service of the Army by the provision of War Hospitals organised upon the same lines as the Field Hospitals of the Army, by hospital trains and railway station infirmaries. It collects the gifts intended for the Army and ensures their distribution. Lastly, it organises a system for the information of those who make enquiries as to the fate of soldiers at the front. The official regulations lay down the constitution of the committee and sub-committee. The President of the Central Committee is appointed by the King upon the recommendation of the Ministers of War and of Marine. At the moment of mobilisation, this President is the sole representative of the Association with these Ministers. The Commissaries of the Association delegated to armies are placed under the orders of the Army Intendant. The Association is only allowed to recruit its *personnel* from those free from military obligations or from the national militia.

In 1902, the Association had 25,000 members and possessed funds and material to the value of 6,777,642 lires (£268,953).

The Association could place at the disposal of the Minister for War, 8 hospitals of 100 beds, 41 hospitals of 50 beds, which in need could be raised to 100 beds each, 54 mountain ambulances, 244 railway station dispensaries, 15 hospital trains, 2 river ambulances boats, 2 hospital ships, besides 8 large depôts of stores.

The Association practises its *personnel* as often as it can, and with this aim takes part in the autumn army manœuvres. In 1900, it mobilised 6 War Hospitals, 1 Mountain Ambulance and sections of hospital trains (Sicily and Bari). It has undertaken the cure of the sick amongst the peasants of the Roman Campagna who are annually afflicted with malaria. Since 1899, eight of its ambulances have been employed in the most fever-stricken portions of this region.

Association of the Italian Knights of the Order of Malta.—It has the same aims as the last, but through special favour has complete autonomy. It is governed by a committee, the president of which in war-time becomes its Commander and represents it with the Minister of War. The Commander, with the consent of the Minister, appoints a delegate, who accompanies the army in the field and places himself under the order of the Intendant-General.

The *personnel* wear the Geneva and the Maltese Crosses. The Association has organised 3 hospital trains, each accommodating 280 wounded.

Reviews.

REPORT ON THE SURGICAL CASES NOTED IN THE SOUTH AFRICAN WAR, 1899-1902.

This Report is the work of a committee of officers, and has been edited, and in great part written, by Surgeon-General W. F. Stevenson, C.B., K.H.S., late Professor of Military Surgery, R.A.M. College, and Principal Medical Officer, Headquarter Staff, South Africa.

It is very greatly to be regretted that out of the large number (nearly 23,000) of wounded in the South African War, only some 1,650 cases were recorded fully enough to be of any use in preparing this Report. The fact that the Report is based upon little more than 7 per cent. of the total number of wounded in the war, at once invalidates all the statistical conclusions drawn, as it is most unlikely that the rates of mortality, of infection of wounds, of amputation for different injuries, &c., in so small a proportion of the cases, fairly represent, or even approximate to, the true rates for the whole number. Further, in many instances, the number of cases under review is so small that no reliance can be placed on any statistics based on them. The reasons for this most unfortunate lack of material are explained in the editor's introductory remarks, and while it must be recognised that there will always be great difficulties in the way of case-taking in the field, particularly at the immediate front, it is to be hoped that in any future war an improved and simplified method of recording cases, such as that suggested in this Report, may be adopted, and more especially that all medical officers will recognise the importance of this perhaps unattractive and tedious part of their duties, and will endeavour to carry it out as fully as time and circumstances may permit. Elaborate records are not necessary; all that is required is a brief, concise and accurate statement of the important points of each case from its commencement to its termination.

In spite of the scanty material on which they had to work, Surgeon-General Stevenson and his coadjutors are much to be congratulated on the excellence of this Report, which adds to our knowledge on many important points, and shows throughout careful, thorough and painstaking analysis of the evidence available.

In the section on head injuries, Surgeon-General Stevenson emphasises the necessity of operating on every case of gunshot injury of the cranium, and is able to point to decidedly improved results from treatment on these lines. A very helpful description of the method of operating is given.

The section on injuries of the spine is also by Surgeon-General Stevenson, and in this attention is directed to the very severe concussion effects produced on the spinal cord by the modern bullet, effects which greatly add to the difficulties of diagnosis and treatment, and render operation useless except in rare and exceptional cases.

Surgeon-General Stevenson also contributes the section on abdominal injuries, the notes of the cases having been collected by Major (now Lieutenant-Colonel) Mallins. Among the many points of interest dis-

cussed special notice is drawn to the marked difference, as regards both prognosis and treatment, between small-bore bullet wounds of the intestine and rupture of intestine from contusion of the abdomen; a considerable number of the former class of cases recovering without operation, while the latter are almost invariably fatal if left alone. The reasons for the unexpected recovery without operation of a considerable proportion of cases of penetrating gunshot wound of the abdomen are fully gone into, and under the heading of treatment, the circumstances under which operation should and should not be undertaken are well summarised in the light of the experience gained during the war.

The sections on wounds of the chest and neck are by Major Holt, D.S.O. A careful analysis of the symptoms in wounds of the chest is given, special attention being paid to the important complication of hæmothorax and its treatment.

Lieutenant-Colonel Hickson contributes the sections on injuries of bones and joints, and gives an excellent and instructive description of the various types of fracture caused by the modern rifle bullet. In speaking of treatment, he lays stress on the extreme importance of preventing infection of the wound, and indicates the cases in which removal of loose fragments is advisable. The bad results of primary amputations at the joint are also noticed. In wounds of joints, the comparatively slight damage done by the small-bore bullet and the greatly improved results of modern methods of treatment are well described.

In the sections on wounds of vessels and nerves, by Lieutenant-Colonel Sylvester, the most striking points brought out are the extremely bad results of proximal ligature of the artery in cases of arterio-venous aneurysm, and the importance of concussion of nerves by high velocity small-bore bullets as affecting both prognosis and treatment in cases of nerve injury.

Surgeon-General Stevenson also contributes a note on nerve injuries, and a paper by Civil-Surgeon Young, printed as an appendix to the Report, contains a series of cases of gunshot injuries of nerves, fully recorded and discussed at some length.

Short notes by the editor on the first field dressing, on lodged bullets, and on X-rays in the field, together with a brief statement of the total casualties in the war, complete the volume.

Numerous illustrations, chiefly reproductions of skiagrams, are appended to the various sections, and almost all of these are excellent.

From a perusal of this Report, it is more than ever evident that the most important point in the treatment of wounds in war is to prevent infection. The weak spot in our present organisation, considered from this point of view, is the field hospital. Owing to the conditions under which surgical work in field hospitals has to be done, this will always be the case, but we must clearly recognise that to obtain improved results in any future war we must look to improvements in the first field dressing, to better instruction of all ranks in the use of it, and, most of all, to changes in the organisation and equipment of our field hospitals designed to minimise, as far as possible, the many and well-known disadvantages and difficulties under which the military surgeon works in the treatment of wounds at the most critical stage in their course.

THE NATURE AND TREATMENT OF CANCER (SOME METHODS OF HYPODERMIC MEDICATION IN THE TREATMENT OF INOPERABLE CANCER). By John A. Shaw-Mackenzie, M.D.Lond. Second Edition. (Baillière, Tindall and Cox, London).

This is a little book of eighty pages, and is dedicated to Colonel T. Ligertwood, C.B., who is well known to at least two generations of our brother officers. He seems to have helped greatly in the work on which this booklet is based. We have given the full title of the book because in that part of the title placed in brackets lies the explanation of its real purport. By various methods, the author has tried repeatedly and often successfully to improve the condition, during their last days, of those unfortunates suffering from inoperable cancer; nay, he seems even in some few cases to have produced what may turn out to be permanent cures. Some of the pathology expounded will not, however, yet find general acceptance; for instance, on p. 47 the author states: "The parasitic origin of cancer has come to be regarded as an *impossible theory*." This hardly will meet with the approval of last year's Bradshaw Lecturer at the Royal College of Surgeons, who, speaking of the life-history of the carcinoma cell *outside the body of the host*, says: "We have learned that it can live; we have now to learn whether it can thrive outside the body of the host"; and all who are familiar with Mr. Butlin's work will at once acknowledge him as one who speaks with authority. But apart from our unwillingness to accept Dr. Shaw-Mackenzie's pathology, there can be no doubt that he has done a great deal to alleviate terrible suffering by way of easing pain and by removing fœtor in these very advanced cases of malignant disease, which are far beyond the surgeon's aid. We would ask all those of our readers who have the care at any time of such cases to read this little book very carefully, and to follow out conscientiously his methods, and so give them every trial. The treatment consists mainly in the subcutaneous injection of soap, of chian turpentine and of purified ox-gall: this is all so simple and easy as to present no difficulty to any careful practitioner.

M. P. H.

Current Literature.

Enteric Fever in the Garrison of Bar le Duc. By M. Baills, Medécin Major de 2e Classe. (*Archives de Méd. et Pharmacie Militaire*, December, 1905.)—This is an account of the incidence of enteric fever in the 94th Regiment of Infantry in the frontier station of Bar le Duc (Meuse). The average strength of the regiment (five battalions) during the period covered was 2,000 men. The author gives a diagram showing the number of cases by months from 1890-1904. Up to January, 1900, the incidence of enteric fever in this regiment was heavy, the maximum in 1892, when 94 cases occurred, 70 in January. The largest outbreaks occurred in December to January, but a lesser incidence is shown several times between May and October; taken as a whole the diagram shows an irregular distribution. After the outbreak originating in June, 1899, continuing with a small prevalence to December, 1899, and culminating in 33 cases in January, 1900, enteric fever practically ceased to exist in this regiment; 4 cases occurred during the remaining eleven months of 1900, 1 case only in 1901, 1 in 1902, 2 in 1903, and none in 1904.

From 1880, the town and barracks of Bar le Duc received their water from a spring rising at Fains (a small village a little more than a mile to the west), which seemed to be of satisfactory quality. But analyses of this water up to 1885 had always been made on samples which were perfectly clear, and resulted in the water being classed among the purest in France.

After the introduction of this water supply enteric fever always appeared in epidemics, and these epidemics set in fifteen to twenty days after the beginning of wet weather. At these times, also, the water, normally pure and limpid, became turbid, the more rapidly when rainstorms occurred over the catchment area from which the spring was supplied. This catchment area is seamed with faults, fissures, pits, &c., allowing direct contamination of the subsoil water by surface washings. One pit in particular is the normal receptacle for the surface drainage of the village of Comble, and this leads directly into the spring at Fains. Fluorescence poured into these surface channels appeared in the spring water.

From 1896 samples of the water were examined when turbid as well as when clear, and showed a marked difference; colon bacilli were present in the former, not in the latter; the water was condemned. Later examinations have shown, however, that even when clear the water is not absolutely pure; and examinations in 1900 showed that it was contaminated by surface washings, and contained colon bacilli.

Following the results of analyses in 1897, the drinking water was boiled whenever it became at all turbid. During the winter 1897-1898 no cases of enteric fever occurred.

In the spring of 1898 six fifty-candle Chamberland (André) filters were installed; two per battalion. But in spite of daily cleaning and frequent sterilisation, they did not appear to be entirely satisfactory, and a small epidemic began in June (already referred to). Examination of the water showed that filtration was imperfect.

The filters were no longer used, the water was invariably boiled, till on February 27th, 1900, a Caillard-Desmaroux steriliser was installed. The results from January, 1900, have already been detailed.

The town water supply, partly from wells, partly from the spring at Fains, still remained dangerous, and possibly accounted for the sporadic cases occurring between February, 1900, and December, 1904.

The interesting points are :—

(1) The increased contamination of the spring following rain.
(2) The consequent epidemics of enteric fever.
(3) The failure of filtration.
(4) The success of sterilisation by heat.

R. J. S. Simpson.

Distribution of Malta Fever.—Having in view various statements which have been made recently that Malta fever has not the wide distribution which we have always given to it, especially in India, it is very interesting to read an article which appears in the current number of the *Lancet* (February 17th), written by Captain Forster, I.M.S., Deputy Commissioner, Punjab.

Lamb and Pais had already taken up the work of investigating some suspected cases of Malta fever in the Punjab, and very soon were able to dispose of all doubts on the subject by isolating the *Micrococcus melitensis* from the spleens of a number of persons suspected to be suffering from Malta fever. Following on the observations of Major Horrocks and Dr. Zammit, Captain Forster then decided to repeat their experiments by examining the milk of the goats which supplied the 14th Sikhs at Ferozapore, in which regiment there were some cases of Malta fever.

He examined thirty-eight goats, and found that four definitely reacted to *M. melitensis* in a dilution of 1 in 20, or a percentage of 10·5. To confirm his results, he sent two of the goats to the Pasteur Institute, Kasauli, where, after most careful and a very thorough investigation, his results were confirmed.

Mosquitoes and Yellow Fever (Mosquitoes et Fièvre jaune). By Drs. Chantemesse and Borel. Price 1s. 6d. (Baillière et Fils, Paris).—This little book sums up the sanitary regulations applicable to yellow fever for the protection of Europe. It commences with the following quotation from one of the Articles of the International Sanitary Convention of Paris, 1903: "The countries interested in this matter are advised to modify their sanitary regulations in such manner as shall bring them into harmony with the actual scientific data as to the method of the transmission of yellow fever, and especially as to the part played by mosquitoes as germ-carriers of this disease."

The prophylaxis is based on the following established points: (1) The poison of yellow fever circulates in the blood; (2) the *Stegomyia fasciata* mosquito, *if itself infected for at least twelve days*, is capable of propagating the disease; (3) *Stegomyia fasciata* is the only mosquito capable of acting in this capacity.

The whole world, as regards yellow fever, is divisible into two great regions, according as to whether *Stegomyia fasciata* can or cannot exist there; in the one, Stegomyia can live, this region is therefore liable to infection by yellow fever; in the other, Stegomyia cannot live, and it

may be therefore considered as not liable to infection. The habitat of Stegomyia is everywhere strictly limited by the two parallels of latitude 43°, both north and south, therefore, all countries outside these limits may be considered as unlikely to become contaminated. Moreover, a temperature of about 82° F. is necessary to enable the Stegomyia to carry on its normal state of existence, especially with relation to its functions of reproduction.

In the case of a country liable to infection this may become infected in two ways: (1) By the introduction of a patient suffering from yellow fever, during the dangerous period of this disease, and if Stegomyia is always to be found there; (2) by the importation of Stegomyia suitably infected, and if, after having contaminated healthy individuals, these insects meet with the conditions necessary for their existence, and above all for their reproduction. Those countries liable to become infected are all situated within the zone included between the two parallels of 43° of latitude.

A critical historical study of the localities in Europe where yellow fever has appeared shows that this disease has almost entirely disappeared from this continent since 1870. The progressive improvements in ship-building since this same date have also rendered the preservation and more especially the multiplication of mosquitoes on board ship a very difficult matter, and there is no insurmountable difficulty to be feared for the elimination from our ships of the rare specimens of Stegomyia which might chance to be found on them; the engine-rooms or their vicinity are the more likely spots in which mosquitoes might be found. The prophylactic measures to be taken against yellow fever are quite simple ones, even in countries where Stegomyia is known to exist; these are the protection of the patient from mosquito bites, and the destruction of these insects wherever found, as also of their breeding-places; in all other countries yellow fever may be considered as non-contagious and non-transmissible, and therefore as one calling for no special measures. There is also no reason why the bodies of persons dying of yellow fever in the colonies shall not be brought home.

J. E. NICHOLSON,
Lieutenant-Colonel (*R.P.*)

Correspondence.

THE POSSIBLE INFECTION OF MAN WITH MALTA FEVER BY GOATS' MILK.

TO THE EDITOR OF THE "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

DEAR COLONEL BRUCE,—With regard to the supposed outbreak of Mediterranean fever on the s.s. "Joshua Nicholson," a man, Wm. Bodtmann, aged 27, a German fireman, was admitted to the Colonial Hospital, Gibraltar, on July 2nd, 1905, from the ship on its outward voyage from London and Hamburg. He was diagnosed as suffering from gastric catarrh. He had no rise of temperature, and six days after admission was discharged cured.

Yours sincerely,
W. H. HORROCKS.

Gibraltar,
January 19*th*, 1906.

TREATMENT OF CHOLERA.

TO THE EDITOR OF THE "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

DEAR SIR,—In the October number of the Journal a note appeared by Lieutenant-Colonel Gubbin on the treatment of cholera by the infusion of normal saline into the subcutaneous tissues. I have myself tried this treatment with success on several cases of choleraic dysentery and severe diarrhœa associated with collapse, the *rationale* being, of course, the same. I found it more convenient to inject the fluid intravenously, this method being quicker, more easily performed, and more certain in its results. I should like to point out, however, that the treatment is by no means new, having been used by Latta, of Leith, in the treatment of cholera as long ago as 1832; in 1854, intravenous injections of milk were used by Bovell, of Toronto, in the treatment of this disease. The treatment is also mentioned in Osler's "Medicine," and Manson's "Tropical Diseases."

I am, Sir, yours faithfully,
KEPPEL H. REED,
Lieutenant, R.A.M.C.

Jhansi, United Provinces, India,
January 9*th*, 1906.

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Original Communications.

REPORTS OF THE COMMISSION APPOINTED BY THE ADMIRALTY, THE WAR OFFICE, AND THE CIVIL GOVERNMENT OF MALTA, FOR THE INVESTIGATION OF MEDITERRANEAN FEVER, UNDER THE SUPERVISION OF AN ADVISORY COMMITTEE OF THE ROYAL SOCIETY.

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GOATS AS A MEANS OF PROPAGATION OF MEDITERRANEAN FEVER.

BY MAJOR W. H. HORROCKS AND CAPTAIN J. CRAWFORD KENNEDY.
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IN Part III. of the Reports of the Commission a preliminary note was published on this subject, in which it was shown that goats in Malta suffer from Mediterranean fever, and excrete the *Micrococcus melitensis* in their milk and urine. The further study of this subject may be divided into the following parts:—

(1) Examination of goats living in pens (*a*) in the immediate neighbourhood of Valletta and Sliema, and (*b*) in the more remote parts of the Island.

(2) Experiments made to determine the possibility of infecting animals by feeding them on milk cultures and infected milk.

(3) Experiments to determine the mode in which the goats themselves become infected.

(4) Experiments to determine whether it is possible to destroy the *M. melitensis* by Pasteurisation of the infected milk.

(1) Examination of Goats Living in Pens (*a*) in the Immediate Neighbourhood of Valletta and Sliema, and (*b*) in the more Remote Parts of the Island.

Examination of Goats Supplying Milk to Forrest Hospital.—This herd consisted of fifteen goats, and five reacted to the *M. melitensis*. The serum of Goat No. 37 reacted in a dilution of 1—60, but the sera of Goats Nos. 38, 39, 43, and 48 only reacted in a dilution of 1—20.

Goat No. 37.—This goat was in good health, and its udders were full of milk. On July 4, 5, and 6 the plates made with the deposit from 2 cc. of the milk were found densely crowded with small colonies of the *M. melitensis*. The milk was again examined on August 12, September 6, and October 8, and on each of these occasions the plates were found densely crowded with colonies of the microbe. The physical characters of the milk appeared perfectly normal at each examination.

Goat No. 38.—The milk from this goat was centrifugalised, and the deposit plated on July 4, 5, 6, 7, 8, 10, 14, 17, 18, 25, August 19, September 6, and October 8. The *M. melitensis* was never recovered.

Goat No. 48.—The milk from this goat was examined on the same dates as No. 38. The *M. melitensis* was not isolated.

Goat No. 43.—The milk from this goat was also examined on the same dates as No. 38. The *M. melitensis* was not recovered.

Remarks.—The examination of Goat No. 37 shows that the *M. melitensis* may be excreted steadily in milk for three months without any change occurring in its physical characters. It was thought that Goats Nos. 38, 43 and 48 might be in an earlier stage of the disease than No. 37, and that if they were kept under observation the *M. melitensis* might eventually appear in the milk. Though the goats were kept under examination for three months, the specific *M. melitensis* was never recovered from the milk.

Examination of a Small Herd Supplying Milk to Valletta Hospital.—This herd consisted of thirteen goats, and four reacted to the *M. melitensis*.

Goat No. 30.—The serum of this goat reacted only in a dilution of 1—20. The microbe was recovered from the milk from July 1 to July 6, but after this it disappeared.

Goats Nos. 27 *and* 32.—The milk from these goats was examined during June, July, August and September, but no signs of the *M. melitensis* were detected. The serum of Goat No. 27 reacted in a dilution of 1—100, and that of No. 32 in a dilution of 1—60.

Remarks.—The *M. melitensis* was not isolated from the milk of the two goats which, judged by the serum reaction, would have been considered the most severely infected. In the case of Goat No. 30 the excretion of the parasite continued only for one week, though the secretion of the milk was maintained in good quantity and quality for three months.

Examination of a Small Herd Supplying Milk to Valletta.—This herd consisted of twenty-five goats, and seventeen showed a blood reaction.

Goat No. 50.—Plates made from the milk of this animal were found densely crowded with colonies of the *M. melitensis.*

Goat No. 52.—During the first week of July the milk of this goat was found to be markedly infected, but examinations made in August, September, and October failed to show any signs of the *M. melitensis*, though the quantity and quality of the milk continued good.

Goat No. 68.—The milk of this goat contained a comparatively small quantity of the *M. melitensis*, only 100 colonies being found in the plates made with the deposit from 1 cc.

Remarks.—The severity of the infection of these goats, judged by the serum reaction, should have been the same, and as the animals were in full milk, the excretion of the microbe might have been expected to occur to the same extent in all the animals. Such was not the case, and judged by the excretion in the milk it appeared that Goat No. 68 was only infected to a small extent.

Examination of a Small Herd Supplying Milk to Sliema.—Two goats were bought from this herd and placed in the Lazaretto.

Goat No. 15.—The milk of this animal contained large quantities of the *M. melitensis* during the first week of July, but examinations made in August, September, and October failed to demonstrate the presence of the specific *M. melitensis.* The quantity and quality of the milk, however, continued good.

Goat No. 16.—The milk of this goat was examined during July, August, September and October, but no signs of *M. melitensis* were detected. The blood serum, diluted 1—60, caused immediate agglutination of the microbe when the animal was bought in July, and examinations made at later dates showed that the blood reaction was unchanged.

Remarks.—It appears from the results obtained in the case of Goat No. 16 that an animal may have a marked blood reaction lasting for four months, and yet never excrete the *M. melitensis* in its milk.

Examination of Goats at Hamrun.—These goats supply a large portion of the milk consumed in Valletta. The following herds were examined:—

Herd No. 1.—This consisted of forty-six goats, and twenty-six reacted to the *M. melitensis*, *i.e.*, six in a dilution of 1—100, four in a dilution of 1—60, two in a dilution of 1—40, nine in a dilution of 1—20, and five in a dilution of 1—10. Only one of these goats showed an excretion of *M. melitensis* in the milk, and the blood serum reacted in a dilution of 1—100.

Herd No. 2.—There were thirty goats in this herd; the *M. melitensis* was only found in the milk of one goat. The blood could not be examined, as the owner of the goats refused to allow a specimen to be taken.

Herd No. 3.—There were twenty-six goats in this herd. The *M. melitensis* was not isolated from the milk of any of them.

Herd No. 4.—There were forty-five goats in this herd. All proved to be quite healthy. No signs of the *M. melitensis* could be discovered in the milk.

Herd No. 5.—This herd consisted of thirty-two goats. The milk from five of them was found to contain the *M. melitensis* in large quantity.

Remarks.—Only 3·3 per cent. of the goats examined contained the *M. melitensis* in the milk.

Examination of Goats at Pieta.—These goats supplied milk to Valletta; there were thirty-two animals in the herd, and twenty-four reacted to the *M. melitensis*, *i.e.*, thirteen in a dilution of 1—100, one in a dilution of 1—60, two in a dilution of 1—40, four in a dilution of 1—20, and four in a dilution of 1—10. The large number of goats with a high serum reaction was remarkable. Only six goats were found excreting the *M. melitensis* in the milk, and the sera of all these reacted in a dilution of 1—100.

Remarks.—About 18·7 per cent. of the goats in this herd were found excreting the *M. melitensis* in the milk.

Examination of Goats at Paolo.—These goats supplied milk to Paolo and parts of Cospicua and Senglea. There were twenty-four goats in the herd, and seventeen reacted to the *M. melitensis*. Only three goats were found excreting the microbe in the milk; the blood of two of the goats reacted in a dilution of 1—100, and

the third in a dilution of 1—60. Three goats having a blood reaction of 1—100 showed no signs of the microbe in the milk.

Remarks.—About 12·5 per cent. of the goats in this herd were found excreting the *M. melitensis* in the milk, though judged by the blood reaction some 70 per cent. were infected.

Examination of Goats at Attard.—There were nineteen goats in this herd which supplied milk to Attard. None of the goats reacted to the *M. melitensis,* and the milk of all of them was quite free from infection.

Examination of Goats at Citta Vecchia.—These goats supplied the Military Hospital; there were fifteen animals in the herd, and eleven were found to react with the *M. melitensis.* The milk of five goats was found to contain the specific *M. melitensis,* and of these the blood sera of three reacted in a dilution of 1—100, the serum of the fourth in a dilution of 1—60, and the serum of the fifth in a dilution of 1—40.

Remarks.—About 33 per cent. of the goats supplying the Military Hospital were found excreting the *M. melitensis* in the milk.

Examination of Goats at Zeitung.—These goats supplied the three cities. There were ninety-three animals in three herds. The milk of only one goat was found to contain the *M. melitensis.*

Examination of Goats at Zabbar.—Four herds were examined. There were forty-four goats in the first herd, and the *M. melitensis* was found in the milk of four of them. In the second herd, containing twenty-eight goats, no signs of the microbe could be found in the milk of any of the animals. In the third herd there were forty-one goats: *M. melitensis* was found in the milk of only one animal. In the fourth herd, consisting of nineteen goats, the milk of one was found to contain the *M. melitensis.*

Remarks.—About 4·5 per cent. of the goats were found excreting the *M. melitensis* in the milk.

Examination of Selected Goats at Balzan.—The goats were first subjected to the milk test, and twenty-one of them showed a tendency to agglutinate the *M. melitensis.* The milk from these animals was carefully "plated," but the microbe was only recovered from the milk of six of them.

Remarks.—About 29 per cent. of the goats selected by the milk agglutination test were found excreting the *M. melitensis* in the milk.

Examination of Selected Goats at Casal Lia.—These goats were also subjected to the milk test, and thirteen appeared to be infected. The *M. melitensis*, however, was only found in the milk of four of them.

Remarks.—About 30 per cent. of the selected goats were found excreting the *M. melitensis* in the milk. The percentage was practically the same as that obtained in the case of the goats selected at Balzan.

Examination of Selected Goats at Zabbar.—Five appeared to be infected, judged by the milk test, and the *M. melitensis* was found in the milk of two of them.

Remarks.—About 40 per cent. of the selected goats appeared to contain the *M. melitensis* in the milk, but the figures are too small to be of any practical value.

Examination of Goats at Melleha.—There were ninety-one goats in the herds, and sixteen showed a reaction with the *M. melitensis;* the specific microbe was not found in the milk of any of them.

Examination of Goats at the Lunatic Asylum.—There were thirty-one goats in this herd, which was kept in the Asylum grounds. The goats were not allowed to graze in the public streets. A careful examination of the milk, by means of the agglutination test, was made, but no reaction was obtained. Ten cubic centimetres of milk from each animal were then centrifugalised and the deposit "plated"; no signs of the *M. melitensis* were observed in any of the plates.

The degree of reaction obtained in the infected goats, worked out to a dilution of 1—100, is as follows: Of the 138 goats, thirty-five reacted 1—10; thirty-five 1—20; twelve 1—40; fifteen 1—60; two 1—80, and thirty-nine 1—100.

Examination of Goats' Milk for Agglutinative Reaction to Micrococcus melitensis *(Zammit's Test).*

Two methods were tried:—

(1) *Sedimentation in Tubes.*—The milk was diluted with four times the amount of emulsion of *M. melitensis* and left standing for twelve hours in sedimentation tubes. This method was found to be unreliable, as the sediment often consisted of fat and *débris*, and always required to be submitted to microscopic examination.

(2) *Agglutination under the Microscope.*—Equal parts of milk and emulsion were placed on a slide and allowed to stand for twelve hours in a moist chamber. At the end of this time the fatty part of the milk had collected in the centre and the surface of the drop, leaving the edges and the bottom clear. The clear part was then examined under ⅛ inch lens for clumping of *M. melitensis*. It should be noted that the milk was prevented from turning sour by adding one drop of 40 per cent. of formalin to 10 cc. of milk.

The second method was found much the more certain, and, after a trial of fifty-seven samples of milk examined in both ways, was adopted in preference to the first. Samples of the milk of fifty-seven goats whose blood had been tested were examined in both these ways. The examination of the blood showed a positive agglutinative reaction to *M. melitensis* in forty-one. The milk gave a positive reaction—(1) by sedimentation in seventeen, (2) by microscope in twenty-seven.

In all, the reaction of 115 samples of milk was examined, and a positive reaction was obtained in forty-seven. All these samples were more or less selected, and cannot be taken as a fair average; of these, eighty-six were examined for serum reaction, with the following results :—

Blood positive, milk positive	42	= 48·8 per cent.
Blood positive, milk negative	16	= 18·6 ,,
Blood negative, milk negative	28	
	86	

∴ Milk gave a reaction in only 72·4 per cent. of those giving a serum reaction.

Of the sixteen goats (blood positive and milk negative), nine reacted 1—10; three 1—20; three 1—40; and one 1—100.

Remarks on the goats whose blood was examined for reaction to Malta fever. It was expected that those goats whose blood reacted would have some symptoms of illness, but this was not apparent except in a few instances. A few goats were noticed to have an unusual degree of lassitude and to be off food. In the later stages of the infection, when the milk was beginning to dry up, a short, hacking cough was noticed, and the goats appeared to steadily lose flesh, the coat also became thin. The quantity and quality of the milk seemed in most cases to be unaffected, indeed it was remarked how often the best milkers in the herd were picked out as a result of the blood examination. Ten of the goats reacted in a dilution of 1—100, and their daily milk production was from two to six pints.

A good average milk production is from four to five pints a day, so it appears that when the blood reaction is very marked there may be a diminution in the quantity, though the physical characters and chemical composition of the milk remain unchanged. Pregnancy goes on uninterruptedly in infected goats; a miscarriage was reported only in one instance.

The Relation of the Blood and Milk Agglutination to the Infection of the Milk.

As a rule, if the blood agglutination was over 40 dilutions the milk reaction was present in 85 per cent. If the blood agglutination reached only 20 dilutions, the milk reaction was present in 60 per cent., and in 10 dilutions only 30 per cent. In six of the goats where the reaction in the blood did not go beyond a dilution of 1—10 yet the milk reaction was present.

It is thrown out as a suggestion that the presence of the reaction in the milk may be a better guide to the presence of *M. melitensis* in the milk than the examination of the blood, especially when a good case can be brought forward, such as Goat No. 4 (Lazaretto). In this case the milk reaction was present, though the blood reaction was only 1—10, and at the same time the Micrococcus was being excreted in the milk in very considerable quantities. However, as the excretion of this organism continued in the milk the blood agglutination crept up, until it reached 1—40.

(2) TO TEST THE VIRULENCE OF THE *M. MELITENSIS* EXCRETED IN GOATS' MILK, AND THE POSSIBILITY OF INFECTING ANIMALS BY FEEDING WITH MILK CULTURES AND INFECTED MILK.

To Test the Virulence of M. melitensis *Isolated from Goats' Milk.*

Monkey No. 107 was inoculated, subcutaneously, on July 19th, 1905, with a culture isolated from goats' milk. Reacted 1—10 on the 25th; on the 31st, plated out blood from saphenous vein. Typical growth of *M. melitensis* resulted. September 3rd, blood reacted 1—100. The monkey died. The Micrococcus was only recovered from the mesenteric glands; other organs sterile.

The Micrococcus isolated from goats' milk is therefore virulent.

To Determine the Possibility of Infecting Monkeys and Goats by Feeding with Cultures of M. melitensis *Isolated from Milk.*

Experiment I.—Monkey No. 6. From August 1st to 24th this monkey was fed eight times on potatoes mixed with *M. melitensis* isolated from goats' milk. There was no blood reaction until September 1st, 1—10; September 5th, 1—100. The organism was not isolated during life, but was recovered, *post mortem*, from spleen, liver, kidneys, heart's blood, mesenteric, femoral and axillary glands.

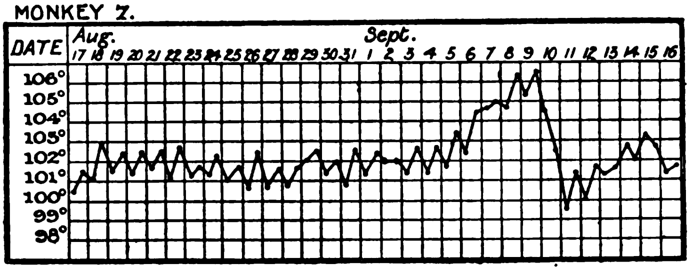
The agar slopes inoculated with the spleen, and the plates, over which sections of the glands had been rubbed, were densely crowded with colonies.

Remarks.—The monkey never suffered from fever, and gained in weight during the experiment. The animal was killed five days after the blood reacted, in the hope of ascertaining whether the mesenteric glands were infected earlier and to a greater extent than the axillary and femoral glands. No difference, however, could be ascertained between the glands; all the organs appeared to be teeming with the *M. melitensis.* The intestines were carefully examined, and no signs of any abrasion or inflammation in the mucous membrane could be detected. This experiment proves that the *M. melitensis* can be absorbed through a healthy mucous membrane, and shows that the organs may be extensively infiltrated with the *M. melitensis* without apparently producing any prejudicial effect on the health of the animal during the first week after absorption.

Experiment II.—Monkey No. 7. From August 1st to 24th this monkey was fed in the same way as the last. On September 5th the blood reacted 1—50; on the 11th, 1—100; on the 20th, 1—1,000. The Micrococcus was not recovered during life.

September 24th.—Killed monkey with chloroform.

MONKEY 7.



Post-mortem Examination.—Body well nourished; femoral and axillary glands enlarged, mesenteric glands not enlarged; spleen enlarged, soft and friable; liver very congested. Cultures were made from the spleen, liver, kidneys, heart's blood, bile, mesenteric, axillary and femoral glands. The *M. melitensis* was recovered from the mesenteric, femoral and axillary glands, the heart's blood and spleen. The plates inoculated with sections of the glands were densely crowded with colonies, but though twelve agar slopes were inoculated with sections of the spleen, only a few colonies were found on four of them.

The chart on page 389 shows the temperature of the monkey during the experiment.

Remarks.—This monkey suffered from a typical wave of fever like Monkey No. 5, fed on infected goat's milk. The distribution of the *M. melitensis* was very similar in the two monkeys. The interval between the commencement of feeding and the first sign of infection was longer in Monkey No. 7, though it received very much larger doses of the *M. melitensis.*

Experiment III.—Monkey No. 8. From August 1st to 24th, fed seven times as in two last experiments. Blood reacted September 1st, 1—10; 7th, 1—500. The Micrococcus was not recovered during life.

September 29th.—Killed the monkey with chloroform.

Post-mortem Examination.—Body well nourished; spleen large and soft; liver and kidneys congested; mesenteric, axillary and femoral glands enlarged. Cultures were made from the spleen, liver, kidneys, bile, heart's blood, mesenteric, axillary and femoral glands. A few colonies of the *M. melitensis* were found in the plates made from the mesenteric, axillary and femoral glands. All the other cultures proved to be sterile.

Remarks.—This monkey never suffered from fever and put on weight during the experiment.

Experiment IV.—Monkey No. 9. This monkey was fed in the same way as the other three. On September 1st the blood reacted 1—10. On the 7th, blood was plated out, and the *M. melitensis* was recovered; on this date the blood reacted 1—1,000.

October 5th.—Monkey died this morning.

Post-mortem Examination.—Fairly nourished; spleen enlarged; liver congested; mesenteric glands not much enlarged, but congested. A little peritonitis present around the colon. Cultures were made from the spleen, liver, kidneys, heart's blood, bile, mesenteric, femoral and axillary glands. The *M. melitensis* was recovered from the femoral and axillary glands.

Remarks.—The rise of temperature and subsequent death of this monkey were caused by the peritonitis around the colon. There were no signs of erosion or perforation of the intestine. The peritonitis was probably due to an external injury caused by an iron bracket placed in the wall for the monkey to sit upon.

To Determine the Period of Incubation.

Experiment V.—Monkey No. 19A was placed in a mosquito-proof chamber in the Lazaretto, and kept under observation for a month before the feeding was commenced. Its blood was repeatedly tested, but no reaction was ever obtained. On Sep-

tember 4th, it was fed with the growth of an agar slope of *M. melitensis* isolated from the milk of Goat No. 15. On September 5th, the feeding was repeated, but after this date no more culture was given. The blood was examined on September 10th, 19th and 23rd, and on October 5th, but no reaction was obtained. On October 7th, however, the blood serum, diluted 1—10, caused immediate agglutination of the *M. melitensis*, the reaction being visible with the naked eye. On October 15th, the blood reaction was noticed to be diminishing, as the serum, diluted 1—10, only gave an incomplete reaction with the *M. melitensis*. On October 16th, the monkey was killed with chloroform. At the *post-mortem* examination all the organs appeared healthy. Cultures were made from the spleen, kidneys, liver, bile, heart's blood and glands. A profuse growth of the *M. melitensis* was obtained from the spleen and from the femoral and axillary glands. The *M. melitensis* was also recovered from the heart's blood. The other cultures proved to be sterile.

Remarks.—The monkey never suffered from fever during life, and did not show any signs of ill-health. Although the blood serum had a very feeble agglutinating reaction, the spleen and glands were extensively infiltrated with the *M. melitensis*. The period of incubation appeared to be about thirty-two days.

Feeding Experiment with Milk Cultures.

Goat No. 12 was placed in the Lazaretto and kept under observation for one month before the experiment was commenced.

July 31st to September 25th, *M. melitensis* isolated from goat's milk was mixed with water and poured down the goat's throat. Blood reacted September 26th, 1—10; October 2nd, 1—50.

The examination of the milk and blood was continued once a week until November 30th. The blood still reacted in a dilution of 1—40, but no signs of the excretion of the *M. melitensis* in the milk appeared. The goat is still under observation.

Remarks.—This experiment shows either that the *M. melitensis* is not always execreted in the milk of goats having a marked blood reaction, or that the excretion is a very late phenomenon.

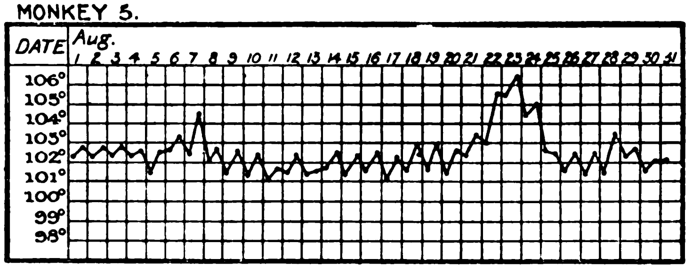
Experiments to Determine the Possibility of Infecting Monkeys by Feeding them with Goats' Milk containing the Micrococcus melitensis.

Experiment I.—Monkey No. 5. From July 26th to August 25th this monkey was fed with milk from infected goats. August 25th, blood reacted 1—10; 27th, 1—30; 31st, 1—100; September 11th, 1—1,000. *M. melitensis* was not recovered during life.

Post-mortem Examination.—After four days' incubation at 37° C. all the plates made from the glands were found densely crowded with colonies of the *M. melitensis.* Out of the twelve agar slopes inoculated with the spleen only one showed the microbe, and on this slope only four colonies were counted. The cultures made from the liver, kidney and heart's blood remained sterile. No sign of the *M. melitensis* could be detected in the plates made from the bile and urine.

The following temperature chart shows a typical short wave of fever such as is usually seen when a monkey is inoculated with the *M. melitensis* subcutaneously.

MONKEY 5.



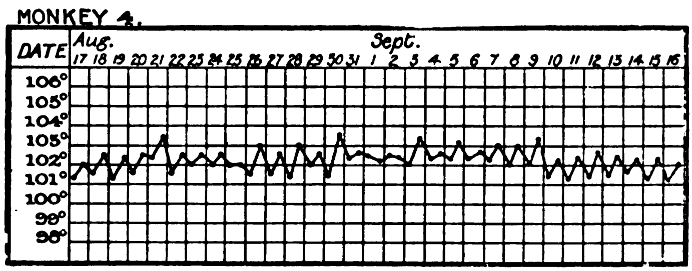
Remarks.—After an interval of about twenty-four days from the commencement of the feeding the monkey suffered from a typical attack of Mediterranean fever. The distribution of the *M. melitensis* in the body was somewhat peculiar, the mesenteric and systemic lymphatic glands being densely crowded with the *M. melitensis,* while the spleen only showed four colonies.

Experiment II.—Monkey No. 4. Fed in the same way as the last. Blood reacted 1—40 on August 28th; September 3rd, 1—50; September 9th, 1—500. The Micrococcus was not recovered during life.

Post-mortem Examination.—After four days' incubation at 37° C. only fifteen colonies were found on the agar slopes inoculated from the spleen. The liver and kidney cultures were sterile, and no signs of the *M. melitensis* were observed on the plates made from the bile and axillary glands. Numerous colonies, however, were found in the plates made from the femoral and mesenteric glands. The following chart shows the temperature of the monkey during the experiment.

Remarks.—After an interval of thirty-three days from the commencement of feeding this monkey became infected, but

there was never any wave of fever as in Experiment I. The distribution of the *M. melitensis* in the body was similar to that observed in the first experiment.



Experiment III.—Monkey No. 2. This monkey was fed in the same way as the last two. From July 26th to October 9th the blood was examined. For the first time on the latter day a slight reaction was obtained after two hours.

From this date the blood was examined weekly, but a definite reaction was not obtained again. The monkey died suddenly on October 18th. At the *post-mortem* examination a localised abscess was found round the sigmoid flexure. The organs appeared healthy. Cultures were made from the spleen, glands and heart's blood. The *M. melitensis* was isolated from the spleen and glands.

A specimen of blood obtained at the *post mortem* was tested for agglutination. A dilution of 1—10 gave an incomplete reaction.

Remarks.—During life the monkey suffered from a wave of fever which was attributed to an infection with the *M. melitensis*, but the *post-mortem* examination showed that the febrile condition might have been due to the abscess round the sigmoid flexure. Although a specific infection undoubtedly occurred, as shown by the isolation of the *M. melitensis* from the spleen and glands, the blood serum only once during life caused complete agglutination of the *M. melitensis*, and that only in a dilution of 1—10.

Experiment IV.—Monkey No. 99. From July 26th to August 29th this monkey was fed in the same way as the last three experiments. August 30th, blood reacted 1—10; September 5th, 1—300. *M. melitensis* was not recovered during life, and only from the mesenteric glands after death.

Remarks.—A blood reaction pointing to the infection was not obtained until about seventy days from the commencement of feeding. The monkey never suffered from fever, but the high dilution in

which the blood serum reacted and the presence of the *M. melitensis* in the mesenteric glands showed that a true infection had taken place.

To Determine the Possibility of Infecting a Goat by Feeding on Infected Milk.

Goat No. 8.—This goat had been in the Lazaretto for two months before the experiment was commenced.

From July 29th to August 24th this goat was fed on milk from infected goats. On October 7th, blood reacted 1—10. The Micrococcus has not been recovered from the milk up to November 30th. The goat is still under observation.

To Test the Possibility of Infecting a Kid by Feeding on Infected Milk.

Kid No. 9.—This kid was under observation for about two months before this experiment was commenced. The blood was repeatedly examined, but no reaction could be obtained with the *M. melitensis.* It was placed in a room quite apart from the infected goats.

From July 13th till August 28th the kid was fed on infected milk. On September 26th, blood reacted 1—10.

October 31st.—Killed the kid and made cultures from the spleen, kidneys, liver, glands and blood from the inferior vena cava. The *M. melitensis.* was not recovered from any of the organs.

Remarks.—Though a blood reaction was obtained, a true infection did not appear to have taken place. Three other kids fed in the same manner are still under observation.

Feeding with Infected Milk and also with Culture Isolated from Spleen of Man.

Goat No. 4.—This goat was kept under observation for three months before the experiment was commenced. Its blood was repeatedly examined, but never showed the slightest reaction with the *M. melitensis.* Milk was removed on several occasions, and the deposit obtained by centrifugalisation plated; no signs of the specific Micrococcus were observed. On June 27th the goat was fed on infected milk obtained from Goat No. 2. On June 28th mixed milk, obtained from an infected herd, was given. Feeding with

this milk was continued until August 16th. The blood serum was examined weekly during June, July and August, but never showed the slightest power of agglutinating the *M. melitensis.* On September 4th the goat was fed with an emulsion in water of an agar growth of the *M. melitensis* isolated from the spleen of man. This feeding was continued every other day until the growth of *M. melitensis* on six agar slopes had been consumed. Examination of the blood for agglutinating reaction, and of the milk for the *M. melitensis*, was continued weekly. On October 6th the blood serum, diluted 1—10, was found to give an immediate reaction with the *M. melitensis.* On October 8th, 5 cc. of blood were removed from the jugular vein, and planted out in broth tubes. After seven days' incubation at 37° C. the broth tubes were found to be sterile. On October 8th blood was again removed from the jugular vein, but the *M. melitensis* was not recovered. On October 18th the blood reaction was found to be the same as on the 6th of that month; dilutions above 1—10 failed to give any reaction. On the 23rd, 10 cc. of the milk were centrifugalised, and the deposit plated; the *M. melitensis* was recovered in small quantity. On October 30th the *M. melitensis* was found in considerable quantity in the milk. On November 2nd the blood serum, diluted 1—20, gave a reaction with the *M. melitensis.* On November 3rd the milk became scanty and thin and serous in character; the microbe could no longer be isolated from it. On November 6th the milk secretion was almost arrested, and on the 13th it had disappeared completely. On November 9th the blood reaction was found to have risen slightly, a dilution of 1—40 causing a complete agglutination of the *M. melitensis.*

Remarks.—The excretion of the *M. melitensis* in the milk did not take place until fifty days after the first feeding with the agar culture derived from the spleen of man, and persisted for only three days.

(3) To Determine the Mode in which Goats become Infected.

It appeared possible that goats might become infected—

(*a*) By feeding on infected dust.
(*b*) By feeding on infected milk.
(*c*) By inoculation through the agency of infected mosquitoes.
(*d*) By inoculation through the agency of infected blood-sucking flies.
(*e*) By direct transmission from mother to kid.

(*a*) *To Determine the Possibility of Infecting Goats by Feeding them on Infected Dust.*

Goat No. 13.—This goat was in full milk when bought. It was taken to the Lazaretto and placed in a room quite apart from the infected goats. Before the experiment was commenced the blood was repeatedly examined, but no signs of a reaction were observed. On July 13th dust, infected with goats' urine containing the *M. melitensis* and then dried, was sprinkled over the food. This was done daily until July 22nd, when dust infected from a case of Mediterranean fever was used. This dust, dried for twenty-four hours at room temperature, was sprinkled over the food for a further period of three weeks. The blood was tested weekly for a reaction with the *M. melitensis,* and on August 3rd the blood serum, diluted 1—10, was found to give an instantaneous reaction. The examination of the blood was continued, but the serum reaction never rose above a dilution of 1—10. Five cubic centimetres of blood were removed once a month from the jugular vein, but the *M. melitensis* was not isolated.

Every week 10 cc. of the milk were centrifugalised, and the deposit plated. On October 16th the *M. melitensis* was isolated from the milk. No rise of temperature was ever observed. The goat is still under observation.

Remarks.—This experiment proves that a goat can be infected by feeding on dust infected with urine from Mediterranean fever patients. The excretion of the *M. melitensis* in the milk appears to be a late phenomenon, as it was not seen until seventy-four days after the blood reaction.

Goat No. 14.—This experiment was conducted on the same lines as the one just described. The dust, however, was often slightly moist, instead of being thoroughly dried as in the case of Goat No. 13. The feeding was commenced on July 20th, and continued until September 1st. The blood was tested weekly for a reaction with the *M. melitensis.* On September 3rd the blood serum, diluted 1—10, gave a distinct reaction. On October 2nd the blood serum, diluted 1—20, caused instantaneous clumping of the *M. melitensis,* but on October 24th the working dilution was only 1—10. Every week 10 cc. of the milk were centrifugalised, and the deposit plated, but up to the present the microbe has not appeared in the milk. The goat is still under observation.

Remarks.—As the dust was imperfectly dried, it was thought that Goat No. 14 would have been more seriously affected than Goat No. 13, and it was expected that the *M. melitensis* would appear in the milk at an earlier date.

(*b*) *To Determine the Possibility of Infecting Goats and Kids by Feeding them on Infected Goats' Milk.*

It is the custom to feed young kids on milk, and this mode of infection appeared probable, but whether the infection so acquired will persist until the adult stage can only be proved by keeping the animals under observation for a prolonged period.

The histories of Goat No. 8 and Kid No. 9 show that a blood reaction may be acquired in this manner. Goat No. 8 is still under observation. Kid No. 9 was killed, but the *M. melitensis* was not isolated from its organs, so a true infection did not appear to have taken place in this case.

Five other kids have been fed on infected milk, and are being kept under observation.

(*c*) *To Determine the Possibility of Infecting Goats through the Agency of Mosquitoes.*

In another section of this report we have shown that *Culex pipiens* and *Stegomyia fasciata* may carry the *M. melitensis*, consequently it appeared desirable to test by actual experiment whether the microbe could be conveyed from an infected to a healthy goat through their agency.

C. pipiens, *S. fasciata*, and *Acartomyia zammitii* were bred from larvæ. About fifty imagoes of each kind were placed in separate cages and fed on the goats from whose blood Zammit had previously recovered the *M. melitensis*. The cages were transferred to the healthy goats after periods which varied in each series of experiments. In the first series the interval between the feeding on the infected and healthy goats was forty-eight hours, in the second series the interval was seventy-two hours. Forty-eight hours after feeding on the healthy goats the mosquitoes were again transferred to the infected goats. The blood of each healthy goat employed in the experiments was tested twice a week for a reaction with the *M. melitensis*. The experiments were continued for two months. It was found that on an average the mosquitoes only lived for about fourteen days, so fresh batches had to be employed as the old ones died off.

The healthy goats never showed the slightest sign of a blood reaction with the *M. melitensis*.

In these experiments the cages could not be fastened to the goats for a longer period than two hours, as the animals struggled violently when kept in one position for a longer time. It was

thought that the failure might have been due to an unsuitable selection of the intervals between the various feedings and to the comparatively short time that the mosquitoes were in actual contact with the animals.

An attempt was now made to imitate the conditions actually occurring in daily life. A small recess in one of the large rooms in the Lazaretto was divided into two compartments, each large enough to hold a goat comfortably, by means of a partition made of coarse wire netting fastened below to a board three feet in height. The board was fixed to the floor of the recess by cement, so that urine could not possibly pass from the infected to the healthy goat. The top and front of the recess were made mosquito-proof, and a small mosquito-proof door was provided for each compartment. Brackets were fastened on the walls of each compartment out of reach of the goats. Jars containing water full of larvæ in the pupal stage were then placed on the brackets in the compartment containing the infected goat, and jars containing water free from larvæ were placed on the brackets in the compartment for the healthy goat. The wooden portion of the partition prevented the goats coming into actual skin contact, but the large apertures in the wire netting readily permitted the mosquitoes to fly from one compartment to the other. This experiment was continued for a month, fresh water containing larvæ being placed in the compartment containing the infected goat as the imagoes died off. At a later period imagoes were bred out in cages and then let loose in the infected compartment. The blood of the healthy goat was examined twice a week, but it never showed the slightest sign of reaction with the *M. melitensis*. The goat is still under observation.

Result.—Up to the present time infection has not been conveyed to healthy goats by means of mosquitoes which had previously fed on infected goats. The failure of the experiments may be due to the *M. melitensis* being present in the blood of infected goats in too small quantity to be conveyed by mosquitoes. In the feeding experiments already described 5 cc. of blood were frequently taken from the jugular vein of infected goats, and yet the *M. melitensis* was never isolated. Zammit succeeded in isolating the *M. melitensis* from the blood of the infected goats used in the experiments once only, all his further attempts failed.

Knowing how intimately goats live with the Maltese people, it seems probable that, if mosquitoes do convey infection to goats, the infecting microbe is obtained from man and not from the goat.

(*d*) *To Determine the Possibility of Infecting Goats through the Agency of Blood-sucking Flies.*

Stomoxys calcitrans having been noticed to infest the goats in Malta, it was thought that this fly might act as an infecting agent. Cages containing about fifty of these flies were placed on the infected goats used in the mosquito experiments, and then transferred after varying periods to a healthy goat. It was soon noticed, however, that unless the flies were fed every forty-eight hours a very heavy mortality took place. Accordingly the interval between the feedings was mainly kept to this period. The flies fed extremely well on the goats, and their bodies were noticed to be distended with blood. The healthy goat's blood was examined twice a week, but no sign of a reaction with the *M. melitensis* was ever obtained. The experiments were continued for two months, fresh batches of flies being employed as the old ones died off.

Result.—Up to the present infection has not been conveyed to healthy goats by *Stomoxys calcitrans* which had been previously fed on infected goats. The cause of failure may be that suggested in the mosquito experiments. Stomoxys will bite man, and it may be that infection is conveyed from man to goat by its means.

The *M. melitensis* has not yet been isolated from Stomoxys fed on goats and monkeys, and on humanitarian grounds it has not been possible to feed the flies, which produce much swelling and irritation, on patients suffering from Mediterranean fever.

(*e*) *To Test the Possibility of Direct Transmission of Infection from Mother to Kid.*

When the herd of goats at Pieta was being examined it was noticed that one of them (No. 19) was pregnant. The goat only gave one pint of milk, which was normal in appearance, and was used for feeding the kids attached to the herd. The blood of the goat was examined and it was found that the serum, diluted 1—100, caused immediate agglutination of the *M. melitensis*. The animal was then purchased and brought to the Lazaretto on July 16th. On July 17th, 10 cc. of the milk were centrifugalised and the deposit spread on glucose-litmus-nutrose-agar plates. After four days' incubation at 37° C. all the plates were found densely crowded with colonies of the *M. melitensis*. The milk was examined weekly until October 23rd, and on each occasion a rich growth of the microbe was obtained. On August 14th and September 14th, 5 cc. of blood were removed from the jugular vein

and planted out in broth tubes. On both occasions the tubes were found quite sterile after ten days' incubation. On October 25th it was noticed that the blood reaction had diminished, a dilution of 1—50 producing complete agglutination, but 1—100 merely produced a few small clumps. On the afternoon of October 25th the goat dropped her kid, which was a male, and quite strong and healthy; it was numbered 19A. On October 27th, 5 cc. of blood were taken from the jugular vein of the goat, but the *M. melitensis* was not recovered. The milk was examined on the same day and found to be teeming with the specific *M. melitensis*. On October 30th and November 3rd the milk was examined again, but no traces of the *M. melitensis* could be discovered. On November 2nd the blood reaction was tested again, and it was found that the serum, diluted 1—125, caused complete agglutination, and small clumps were produced by a dilution of 1—200. On November 13th the serum, diluted 1—200, caused a complete reaction. At the end of November the *M. melitensis* again appeared in the milk.

Kid (19A) dropped by Goat No. 19 on October 25th.—On October 26th the blood was tested for agglutination, and it was found that the serum, diluted 1—50, caused an immediate complete reaction, whilst a dilution of 1—100 only produced a few small clumps. It was noticed that the blood reaction corresponded exactly to that of the mother on the day the kid was born. On November 4th the blood reaction was found unchanged, but on November 13th a dilution of only 1—20 was found capable of producing a complete agglutination of the *M. melitensis*. The kid was then killed and cultures were made from the organs. The *M. melitensis* was not isolated.

Remarks.—This experiment appears to prove that agglutinins are transferred *in utero* from mother to kid. It also shows that pregnancy may progress in a perfectly normal manner when the mother is markedly infected. The suppression of the excretion of *M. melitensis* in the milk for nearly a month after the birth of the kid is interesting.

(4) Experiments to Determine whether it is Possible to Destroy the *M. melitensis* by Pasteurisation of the Infected Milk.

Experiment I.—Milk was drawn from Goats 1, 2, 3, 5 and 6 and thoroughly mixed. This mixed milk was selected for experiment as it contained thick ropy masses, and it was thought that these

might act as protecting envelopes to the specific micrococci, so that if such a milk were sterilised by Pasteurisation, it might safely be concluded that any ordinary normal-looking milk would be equally sterilised by the same operation.

One loopful of the mixed milk was stroked on a series of surface plates to act as a control. The mixed milk was then heated on a water-bath to 68° C. and this temperature was maintained for ten minutes. The milk was then rapidly cooled and 10 cc. of the sterilised milk were spread over twenty litmus-nutrose-agar plates.

Results.—After four days' incubation at 37° C. the control plates were found densely crowded with colonies of the *M. melitensis;* the plates made from the Pasteurised milk remained free from any signs of the specific *M. melitensis,* even though the incubation was continued for fourteen days.

Experiment II.—This served as a control of Experiment I., the same procedure being followed. The *M. melitensis* appeared in the control plates, but the plates made with the Pasteurised milk again remained perfectly sterile.

Summary.

(1) Judged by the serum reaction, 41 per cent. of the goats in Malta are infected.

(2) Ten per cent. of the goats supplying milk to various parts of Malta appear to excrete the *M. melitensis* in the milk.

(3) The excretion of the specific microbe may continue steadily for three months without any change occurring in the physical character or chemical composition of the milk, and without the animal exhibiting any signs of ill-health.

(4) Some infected goats may lose flesh and their coats may become thin; they may also suffer from a short hacking cough. A febrile condition, however, has not been observed.

(5) Goats may have a marked blood reaction (1—100), and yet never excrete the *M. melitensis* in the milk.

(6) If the blood serum or milk does not agglutinate the *M. melitensis* the specific microbe is not found in the milk.

(7) There is no constant relation between the amount of agglutinins in the milk or blood and the excretion of *M. melitensis* in the milk; but the higher the dilution of the serum which agglutinates the *M. melitensis* the greater is the probability of finding the *M. melitensis* in the milk.

(8) The excretion of the *M. melitensis* in the milk may be

intermittent, appearing for a few days and then disappearing for a week or more.

(9) A blood reaction may exist for some weeks before the *M. melitensis* is excreted in the milk.

(10) If blood cannot be obtained the milk reaction with the *M. melitensis* (Zammit's test) is a good indication of infection.

(11) The milk agglutination test is a surer indication of the *M. melitensis* being excreted in the milk than the serum reaction.

(12) Monkeys and goats can be infected by feeding with cultures of *M. melitensis* isolated from milk, and also by feeding with infected milk itself.

(13) The incubation period in feeding experiments appears to vary between three and four weeks.

(14) Monkeys infected by feeding sometimes suffer from a typical wave of fever and lose flesh, at other times they show no obvious signs of ill-health, and may even gain in weight.

(15) When monkeys become infected by feeding with milk the lymphatic glands always contain far more colonies of the *M. melitensis* than the spleen. This fact suggests that the specific micrococci contained in the food are carried to the lymphatic glands and there undergo considerable multiplication. It has not yet been proved that the mesenteric glands are always infected at an earlier date than the femoral and axillary glands, but Experiment IV., feeding with milk, shows that this may be the case at times.

(16) It has been demonstrated that goats may become infected by feeding on dust polluted with urine from cases of Mediterranean fever. The excretion of *M. melitensis* in the milk resulting from such infection is a late phenomenon, only appearing about seventy-four days after the blood reaction has developed.

(17) It has not been possible yet to convey infection from goat to goat by means of mosquitoes or *Stomoxys calcitrans*. If mosquitoes do carry the infection, it seems more probable that the microbe is transferred from man to goat, than from goat to goat.

(18) Agglutinins may be transferred from the mother to the fœtus *in utero*. Pregnancy appears to follow a normal course in infected goats.

(19) Pasteurisation (68° C. for ten minutes) destroys the *M. melitensis* present in infected goats' milk.

(*To be continued.*)

HINTS REGARDING THE MANAGEMENT AND USE OF X-RAY APPARATUS.

By Lieutenant and Quartermaster F. BRUCE.
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In presenting to the readers of the Journal the first of a series of papers dealing with this subject, I desire to point out that it will be treated entirely from a practical standpoint. The published works dealing with the practice of skiagraphy, although excellent in their way, are too much burdened with theoretical matter to be of any real assistance to the average aspirant. It is not altogether necessary to understand the technicalities affecting the manufacture of the instruments. Makers having a reputation to maintain are not likely to supply apparatus which will not stand the test for efficiency. The X-ray worker should simply endeavour to understand the functions of each component part and thus be able, not only to manipulate the instrument as a whole in an intelligent and methodical manner, but at the same time to locate a fault wherever situated. It is advisable, although not indispensable, to have an elementary knowledge of electricity before commencing the study of skiagraphy. The X-ray worker only needs to know the meaning and application of a few of the principal electrical terms, and these will be explained in the text where necessary. With these few remarks as a preface, I will now endeavour to explain the different parts of the apparatus, avoiding technicalities as much as possible, and lastly, how a skiagraph may be taken.

Electrical Supply.—The electrical supply may be either direct or indirect. Direct, when the instrument is connected with a dynamo or public main; indirect, when accumulators are charged from either of these, and afterwards used to supply the necessary current to the apparatus. In the direct method the voltage is too high and must be brought down. Before deciding, however, on this means of supply, it must first be ascertained whether the current is continuous or alternating, as the latter requires a rectifier or transformer. Being satisfied in this particular, the services of an electrician should be obtained to arrange for the necessary current and connections. When a continuous current is available the strength and volume is modified by means of ordinary incandescent lamps placed in circuit. The electrician should be informed

regarding the amount of volts and ampères required, and he will arrange the necessary number of lamps. If the current is required for a ten-inch coil having a platinum interrupter, eighteen volts with five ampères will usually be ample. For the same size of coil, but fitted with a mercury interrupter, at least thirty-two volts with five ampères will be necessary. In either case the lamp resistance should be adjustable, that is to say, it should be possible to increase or diminish at will the number of lamps; the reason being that, as each lamp allows a certain quantity of current to pass, the supply will be under control.

Accumulator Cells.—The indirect supply falls under this heading, and as it is the most generally used, a full description of these cells will appeal to the needs of the average operator. An accumulator cell differs from a primary cell in that its action is the result of current obtained from a dynamo, whereas the action in the latter is originated in the cell by electrolysis. The enumeration of the parts comprising an accumulator cell will, it is hoped, be of some little assistance to the uninitiated.

Case.—Made of teakwood and varnished.

Cells.—Usually made of vulcanite, on account of its non-conducting properties, which provide against leakage of electricity from the cell.

Plates.—These are made of lead, as free from impurities as possible. On their surfaces are cast numerous small holes in which to contain a paste containing red lead for the positive and yellow lead for the negative plates. There is always an odd number of plates in a cell, the positives being in the minority. These being placed side by side in the cell both sides of the positives will be faced by negatives.

Separators.—These are made from strips of vulcanite, and are placed between the plates to prevent contact, and also between plates and sides of cells to give firmness to the section.

Connections.—These are strips of lead and serve the purpose of joining all the positive plates of one cell to all the negative plates in adjoining cell, when the cells are coupled in series.

Electrolyte.—This is the medium by which the current passes from plate to plate, and is composed of sulphuric acid and water. The specific gravity of this solution is 1·2 when the cell is fully charged.

Terminals.—Two brass terminals are fitted to each cell to connect it with an apparatus. The positives are marked + and the negatives —. The former are painted red and the latter black.

Arrangement of Cells.—In batteries containing two or more cells the positive plates in one cell are coupled to the negative plates in an adjoining cell. This arrangement is termed coupling up in series. For example, if the voltage of one cell is two volts, then that of a six-cell battery would be twelve volts. In cases where much current (amperage) is required at a low pressure or voltage, all the positive plates in the cells of a battery are coupled together to form one pole or terminal, and all the negative plates coupled in like manner to form the other pole or terminal. It converts the six cells into one large cell. The voltage, however, is that of one cell, hence the amperage is increased at the expense of the voltage.

To briefly illustrate the above examples of batteries coupled in series and in parallel, the following will show by comparison how the volts and ampères are affected by the different arrangements.

	Volts.	Ampères.
Six-cell battery in series	12 ..	35
,, ,, in parallel	2 ..	210

Capacity of a Cell.—By this is meant the number of hours a given cell will supply an instrument absorbing one ampère of current; in other words, the number of ampère-hours a cell contains. Approximately a square foot of positive plate (not surface) should give 100 ampère-hours.

Voltage (Electro-motive Force).—The voltage of a cell should be 2·5 volts when fully charged, but this pressure quickly falls to 2 volts and remains at this until exhausted, when it rapidly sinks.

Action in the Cell during Process of Charging.—Before the current from the dynamo is switched on, the condition of the plates and electrolyte is as follows:—

Positive Plates.	Electrolyte.	Negative Plates.
$PbSO_4$	$H_2SO_4+H_2O$	PbO

When the current from the dynamo is passed through the cell a series of changes takes place in the plates and electrolyte, molecules of water are removed from the latter and an equal number of molecules of H_2SO_4 added, thus increasing the strength of the solution. The following will convey a general idea of what takes place:—

Positive Plates.	Electrolyte.	Negative Plates.
PbO	$H_2SO_4+H_2O$	PbO

When the cells are fully charged the condition of the plates and electrolyte will be:—

Positive Plates.		Electrolyte.		Negative Plates.
PbO_2	.. ..	$H_2SO_4 + H_2O$	.. ..	Pb

Indications showing that a Cell is Fully Charged.—(1) By me of a voltmeter each cell should give at least 2 volts. (2) T specific gravity of the electrolyte should be 1·2.

Care of Cells.—As the care of cells is by no means the le important item, a few essential points are given in detail regard their management.

(1) *Rate of Discharge.*—The number of ampères taken from cell at one time must never exceed the amount as stated by makers. If exceeded, a strain is put on the plates which they not made to withstand.

(2) The practice of trying the strength of a cell by connect the terminals by a piece of wire cannot too strongly be condemn It short-circuits the plates, and will cause irreparable damage.

(3) Accumulator cells should be kept in as even a temperat as possible, as they are very sensitive to atmospheric variatio This is often the cause of otherwise unaccountable leakage.

(4) Batteries should preferably be placed on glass blocks prevent any possibility of leakage occurring through the medi of moisture either from a damp floor or solution percolating thro the casing from the cell.

(5) The level of the electrolyte should be kept at least a quar of an inch above the tops of the plates.

(6) When cells are being moved from place to place they m be kept as level as possible to avoid spilling the electrolyte. T must also be carefully carried, as knocking and jarring mi possibly damage the plates.

(7) The terminals must be kept clean, as dirty contacts as a resistance, and therefore a needless loss of energy.

(8) The interiors of the cells require to be frequently exami for the purpose of ascertaining if the junctions are in good c dition, and the solution is at the proper level. The colour of solution should also be noted, because if dirty something is wr with the plates. Sulphating should be looked for in order t this evil may be checked in its earliest stages.

(9) The efficiency and life of a cell depends in a great meas on the manner the charging and recharging have been carried c Unfortunately we are in the hands of the people owning charging plant, and damage to plates might be originated thro carelessness in charging, which may not become manifest for so time afterwards, hence the instructions given in No. 8 should carefully carried out.

(10) Cells must on no account be worked when the voltage has fallen below 2 per cell. To keep them in good order they should be sent to the charging station at least once a fortnight, whether they have been worked or not. This system will assist in keeping down sulphating to a considerable extent.

If the foregoing instructions are carefully carried out the evils inherent to accumulator cells will be greatly minimised, if not entirely obviated.

Buckling.—The buckling of a plate infers that it has become bent from some cause, and whilst in this condition there is danger from the paste falling down and not only causing a loss of active surface but by pieces sticking between the plates and short-circuiting the cell. These should be carefully removed, and the cell sent to an electrician for repair, as only skilled workmen are capable of putting matters right. Buckling may be caused by exceeding the discharge as laid down by the makers. It may also be caused by knocking or jarring the cell.

Sulphating.—This is generally the result of overworking the cell, and is known by a white sulphate forming all over the plates; when it appears the addition of a solution of caustic soda to the electrolyte, together with a prolonged recharging, will assist in checking its further progress.

Wires from Battery to Coil. — These should be at least B.W.G. No. 14, in order that the current may not suffer any resistance in passing. They should be well insulated to avoid leakage.

Switch.—An appliance placed in circuit for turning on and off the current.

Rheostat.—A variable resistance placed in circuit for controlling the current.

Cut Out.—An appliance made of stoneware, and is placed in the main circuit. In it is fixed a piece of lead wire calculated to carry any desired amount of current; when this current is by any chance exceeded, the wire offering a resistance to its passage melts and breaks the circuit.

Ammeter.—An instrument for recording the number of ampères passing in a main circuit.

Voltmeter.—Used for measuring the voltage of a cell. It is never placed in the main circuit on account of the resistance it offers to the passage of a current.

The next paper will deal with the induction coil, and the various types of interrupters.

(*To be continued.*)

THE INCIDENCE OF MALTA FEVER AMONGST THOSE EMPLOYED IN THE MILITARY HOSPITAL, VALLETTA, DURING THE YEAR 1905.

By Captain J. CRAWFORD KENNEDY.
Royal Army Medical Corps.

Those employed in hospital come under two categories:—

(1) Men of the Royal Army Medical Corps.

(2) Attached regimental men.

(1) As Valletta is the headquarters detachment of the Royal Army Medical Corps in Malta, a few men are borne on the strength of the hospital who are not actually employed there, but as these are all living in hospital or living outside, but working on hospital premises, I include them in the strength of the hospital, with the exception of one Sergeant, who lives and works in the Brigade offices. The strength of the detachment, therefore, excluding the Sergeant, is as follows: The average strength for the month of January, 1905, was 69—14 Non-commissioned Officers, 55 Privates; the average strength for the month of December, 1905, was 80—15 Non-commissioned Officers, 65 Privates; the average annual strength for 1905 is 73—made up of 14 Non-commissioned Officers and 59 Privates. The following men worked outside hospital premises: One Non-commissioned Officer in the Public Health Laboratory as Assistant to the Mediterranean Fever Commission; six Lance-Corporals and Privates, four in the Principal Medical Officer's office, one in the District Laboratory, and one in the Public Health Laboratory. (2) Regimental men were employed with the Royal Army Medical Corps: (*a*) Permanently to fill three posts, namely, Telephone Orderly, Messenger to the Senior Medical Officer, and general duty in the Women's Hospital; (*b*) temporarily to fill vacancies in the ranks of the Royal Army Medical Corps, due to sickness, &c., and also to help during the time that pressure of work was most severe on the Corps. These men were employed chiefly during the months of July to November, and during that period the average number constantly employed was eighteen. On December 3rd a large draft of Royal Army Medical Corps came out from home and replaced all these temporary men.

The total number employed during the year was fifty-four, and reckoning the average length of time which each man spent in hospital as two months, we get an annual average of nine constantly

employed. Therefore our total annual average strength in hospital during 1905 was:—

Royal Army Medical Corps	73
Permanent regimental men	3
Temporary ,, ,, ...	9
Total	85

The total number of admissions for Malta fever for Royal Army Medical Corps and attached Royal Army Medical Corps is twenty-seven; but of these, four belong to three men (one admitted twice) who had contracted fever during 1904 and who suffered from relapses; these admissions for the purposes of this paper I discount.

The following is a list of the Cases:—

No.	Regiment or Corps.	No.	Rank	Name	Date of admission	How and where employed for two months previous to admission
1	R.A.M.C...	6343	Q.M.S.	Dudman, H. J.	8. 1.05	Assistant Wardmaster 20B Ward.
2	1st R. Bde.	9898	Pte. ..	Davis, H. ..	12. 1.05	Hospital Orderly Female Hospital.
3	R.A.M.C...	17151	,, ..	Brown, J. T. ..	22. 3.05	Senior Medical Officer's Office. Clerk.
4	,,	8198	Cpl. ..	Farr, H. J. ..	28. 4.05	Superintendent Cook Hospital Kitchen.
5	,,	17450	Pte. ..	Elsey, E. W. ..	11. 5.05	Ward duty 20A Ward.
6	,,	16115	Sgt. ..	Dewberry, E. B.	12. 5.05	District Laboratory, Sda. Mercanti.
7	1st R.W.K.	7456	Pte. ..	Franklyn, G. ..	26. 5.05	Hospital Orderly Female Hospital.
8	R.A.M.C...	11864	,, ..	Brooks, S. ..	30. 5.05	Nursing Orderly 20A Ward.
9	,,	12732	Cpl. ..	Hughes, F. ..	4. 6.05	Assist. Day Wardmaster.
10	,,	14901	Pte. ..	Smith, J. W. H.	21. 6.05	Nursing Orderly 20A Ward.
11	,,	17430	Cpl. ..	Woods, W. H...	10. 7.05	Pay Clerk Company Office.
12	,,	14980	Pte. ..	Bowden, A. ..	18. 7.05	General Duty Orderly 20A Ward.
13	,,	19123	,, ..	Smith, A. G. ..	27. 7.05	General Duty Orderly 20A Ward.
14	,,	17778	,, ..	McGill, J. ..	27. 7.05	Nursing Orderly 20A Ward.
15	,,	16001	,, ..	McConaghy, S.	3. 8.05	General duty Passages.
16	,,	14747	,, ..	Robinson, H...	4. 8.05	Assistant Clerk Principal Medical Officer's Office.
17	,,	15753	,, ..	Whitmee, W. ..	7. 8.05	General duty Passages and Latrines.
18	,,	7651	Q.M.S.	Bridges, A. ..	11. 8.05	Steward Store.
19	,,	11951	Pte. ..	Hoodless, T. H.	6. 9.05	Nursing Orderly 20A Ward.
20	1st R.W.K.	7268	,, ..	Pike, F. ..	10. 9.05	General duty 37 Latrine.
21	R.A.M.C...	18652	,, ..	Playle, T. ..	17. 9.05	General duty and Probationer 20A Ward.
22	,,	18215	,, ..	Dewey, W. W...	2.10.05	General duty and Assistant Nurse 20A Ward.
23	,,	16465	,, ..	Griffin, A. E. ..	22.11.05	Assistant Cook Hospital Kitchen.

The twenty-three admissions were distributed amongst the men according to their sections and special employment, as follows:—

Royal Army Medical Corps	Non-commissioned Officers	Orderly Non-commissioned Officer and Wardmaster	2
		Steward	1
		Company Office	1
		Public Health Laboratory	1
		Cook	1
	Privates	Nursing Section	6
		General duty	5
		Cooking	1
		Clerking	1
		Principal Medical Officer's Office ..	1
Regimental, attached to Royal Army Medical Corps		Permanent	2
		Temporary	1
			23

The total of twenty-three in a strength of eighty-five is 270 per 1,000. This compared with the incidence of fever amongst the troops as a whole, which is 82 per 1,000, is very high.

I now proceed to analyse these cases according to—

(1) Seasonal incidence.
(2) Age.
(3) Service in Malta. Service in Valletta Hospital.
(4) Occupation.
(5) Quarters.
(6) Habits.

(1) Seasonal Incidence.

The following table gives the number of cases per month:—

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Nurses.. ..	..	..	..	..	2	1	1	..	2	..	..	..
General duty..	2	..	1	1	2	1	3	4	1	1	1	..
Total	2	0	1	1	4	2	4	4	3	1	1	0

It will be noted that eighteen of the cases occurred in the middle quarters of the year, seven in the second, and eleven in the third. This is in accordance with the occurrence of the fever outside hospital, and therefore there is most sickness in the Corps at the same time as the hospital is full of Mediterranean fever patients.

(2) Age Incidence.

The following are the ages :—

Years	20	21	22	23	24	25	26	27	36	37	39
R.A.M.C. ..	2	5	2	2	1	3	1	1	1	1	1
Att. R.A.M.C...	..	1	1	1	..	..	..	..	..	..	..
	2	6	3	3	1	3	1	1	1	1	1

And the following compares the percentage of cases to strength under and over 25 years of age for the Royal Army Medical Corps alone :—

R.A.M.C.	Under 25 years	Over 25 years
Strength	45	28
Number of cases ..	12	8
Percentage	26·4	21·4

Therefore there is no special liability according to age. This is also in accordance with general observation.

(3) Service in Malta and in Valletta Hospital.

The following table gives strength and number of cases according to total service in Malta :—

R.A.M.C.	Under 1 year	Years 1—2	2—3	3—4	4—5	Over 5 years	Total
Strength	19	13	16	19	3	3	73
Number of cases ..	8	3	6	1	1	1	20
Att. R.A.M.C. ..	1	2	..	..	..	..	3
Percentage	42	23	37	5	33	33	27

The next table gives the number and percentage of cases according to their service in Malta, in order to compare with the same table made out according to service in Valletta Hospital.

Service in Malta	No. of cases	Percentage	
Under 1 year	9	39·1	87 per cent. under 3 years.
1—2 years	5	21·7	
2—3 ,, ...	6	26·08	
3—4 ,, ...	1	4·3	13 per cent. over 3 years.
4—5 ,, ...	1	4·3	
Over 5 years	1	4·3	
	23		

Service in Valletta Hospital	No. of cases	Percentage	
Under 1 year	18	78·2	100 per cent. under 3 years.
1—2 years	..	..	
2—3 ,, ...	5	21·7	
3—4 ,, ...	..		
4—5 ,, ...	..		
Over 5 years	..		
	23		

By comparing these two tables one is forced to conclude that the liability to contract fever is greater in Valletta Hospital than it is in other parts of the Command. Seven cases had been less than six months in Valletta, and all the twenty-three were contracted within three years of arrival in Valletta.

(4) Occupation.

As a basis for the following observations I start with a summary of the average distribution of duties throughout the year. An average has been struck for the last three months of the year, during which time the effective strength of the Royal Army Medical Corps was at its lowest and required to be supplemented by regimental men, and also at its highest. The number constantly sick is the annual average, and the total corresponds to the annual average strength. The following table, besides giving this summary, gives the number of cases occurring in each section and the percentages:—

Duty of section	Average constant strength	Number of cases of Mediterranean fever	Percentage
I.—Ward work	28	9	32·1
II.—General duty outside wards ..	21	7	33
III.—Office work	16	3	18·7
IV.—Cooks	5	2	40
V.—District Staff living or working in hospital	10	2	20
Average constant effective strength	80	23	28
Constantly sick	5·71		
Total ..	85·71		

I take the several sections in order of highest percentage.

Cooking, 40 per cent.—The numbers here are too small to give a reliable percentage. The two cases were:—

Case 4.—(*a*) A Corporal, in charge of the kitchen, who performed the duty of night Wardmaster, in turn with other Non-commissioned Officers. He was married and lived in the Camerata married quarters.

Case 23.—(*b*) A Private, who took ill in November, after being in the Command for only three months. This man, unfortunately, died.

General Duty outside Wards.—I have included in this section the Orderly Non-commissioned Officer (or day Wardmaster), the dispensary (three men), regimental institutes (three men), pioneers and sanitary (seven men), "on Command" (three men), and four men told off to special latrines, a total of twenty-one. The seven cases occurred as follows :—

(*a*) Two were Non-commissioned Officers employed as Orderly Non-commissioned Officer, whose duty is chiefly disciplinary, but also to supervise the venereal ward and the cleanliness of passages and latrines.

Case 1.—A Quartermaster-Sergeant, married, living in Nos. 13 and 14, Married Quarters, Camerata. His infant took sick with fever (in all probability Mediterranean) in November, 1904; he first felt unwell a month after this, and was admitted to hospital on January 8th, 1905. He went home on sick furlough in April, and in his absence his wife lived in Sliema. In July his wife also contracted Mediterranean fever. This man probably became infected in his own quarters.

Case 9.—A Corporal, living in the Non-commissioned Officers' bunk, will be referred to further on.

(*b*) The other five cases were men employed in keeping clean the passages, latrines and washhouses. There are four special latrines :—

(1) 20A Ward.—The acute Mediterranean fever ward. Stools and urine of bedridden cases are not supposed to be emptied here, but in the special place set apart downstairs. (2) 20B Ward.—Venereal. (3) 37 Ward.—Convalescent Mediterranean fever cases. (4) Women's hospital. The particulars of the five cases are :—

Case 15.—Royal Army Medical Corps Orderly employed looking after 20A Ward latrine and passages.

Case 17.—Royal Army Medical Corps Orderly in 20A Ward latrine.

Case 20.—Regimental Orderly, temporarily attached, working in 37 Ward latrine. Had been employed in hospital for two months.

Case 2.—Regimental Orderly. One of the three permanently

attached, had been working in the Women's Hospital for four months before he took ill in January.

Case 7.—Regimental Orderly. Came in the place of No. 2, and took fever in May, after being one and a half months at work.

The proportion of men who became infected whilst employed on these four special latrines is remarkable, and it will be noted that no man employed in 20B Ward latrine became infected.

Ward Work.—The following table gives the distribution of the orderlies of different Sections in the various wards, along with the numbers and proportion that contracted Mediterranean fever. The night duties are included in the wards to which they were posted, namely, 20A, and 34 (surgical).

Ward	Section	Average distribution	Mediterranean fever cases	Percentage
20A	Nursing	6	6	100
	General duty ..	9	3	33·3
Total	.. ..	15	9	60
20, 20C	Nursing	2	..	..
24	General duty ..	2	..	..
20B	Nursing	1	..	..
	General duty ..	2	..	..
29, 34	Nursing	3	..	..
37	General duty ..	2	..	..
Prisoners'	General duty ..	1	..	..
Total	.. ..	13	0	0
		28	9	60

Therefore the only ward to which a case of Malta fever can be traced is 20A. One hundred per cent. of the nursing and 60 per cent. of the full complement of this ward have contracted the fever, as compared with 21·5 per cent. of those employed in all other parts of the hospital. 20A contains fifty beds, and is the acute fever ward, all the really bad cases of fever are treated here, and during the summer there was hardly ever a spare bed. As soon as a patient became sufficiently convalescent he was moved to 37 Ward, and some acute case transferred from 20 or 20C Ward was moved into the vacancy. 20 and 20C Wards contained many mild cases, and all undiagnosed cases not seriously ill were admitted to these wards and treated there until a diagnosis of Malta fever was made.

In the preceding table the number of nurses is shown as six: these were men actually enrolled in the nursing section. However,

many of the general duty men employed here were to all intents and purposes nurses and exposed to the same risks from contagion. Some were probationers for the nursing section, and others assisted the nurses in all their duties. When the work got very heavy in the late summer and autumn, and there was much sickness in the Corps, the number of nursing section orderlies actually employed in 20A fell as low as four, including the night duty. Of necessity, therefore, the general duty had to assist the nursing orderlies. There were only four orderlies on the strength of 20A who did not come in close contact with the patients. I would therefore amend the previous table to read as follows :—

		Average strength	Number of cases of Mediterranean fever	Percentage strength
20A	Nursing section	6	6 =	63·6
	Assistant nurses	5	1 =	
	General duty	4	2 =	50

These figures are very striking, and demand a thorough investigation. I have endeavoured to trace the men who have at any time during 1905 been employed in 20A Ward. I find that forty-one men passed through the ward and worked for varying periods. The following table gives the numbers according to time spent in the ward by months and the numbers in each period that contracted the fever.

Number of months spent in 20A	Number of orderlies	Number who contracted Mediterranean fever	Remarks
1	6	1	
2	5	1	
3	7	1	
4	3	1	* Including two orderlies who have been taken ill with Mediterranean fever since January 1st, 1906.
5	5	3*	
6	2	1	
7	5†	3*	
8	3†	..	
9	..	..	
10	2	..	† Including two orderlies who have had Mediterranean fever before.
11	2	..	
12	1	..	
	41	11	

Up to the eighth month it will be noticed that the liability to contract the fever increased, and only eight men remained for longer periods than this. For the first three months of the year there

was practically no sickness; but let us trace what happened after April 1st to the men serving in 20A Ward at that time. There were nine of the nursing section, three probationers and four general duty orderlies.

Nursing Section.

(1)	A., had Mediterranean fever before; went home trooping	M.
(2)	B., remained well throughout	O.
(3)	Br., Mediterranean fever May 30th	M.
(4)	E., Mediterranean fever May 10th	M.
(5)	H., simple continued fever; tour expired October 14th	S.C.F.
(6)	L., seedy, and simple continued fever in June; sent to Citta Vecchia	S.C.F.
(7)	Mc., sick off night duty; simple continued fever, three weeks, August 20th	S.C.F.
(8)	S., Mediterranean fever June 21st	M.
(9)	W., went trooping June 22nd; returned and went on night duty sixty-one days, October and November; Mediterranean fever January 8th, 1906	M.

Probationers.

(10)	B., simple continued fever six weeks in August and September ..	S.C.F.
(11)	McG., Mediterranean fever July 27th	M.
(12)	P., simple continued fever in August	S.C.F.

General Duty.

(13)	Ba., twenty years in Malta; simple continued fever August to September	S.C.F.
(14)	Bo., Mediterranean fever July 18th	M.
(15)	K., simple continued fever June to July	S.C.F.
(16)	Sm., Mediterranean fever July 27th	M.

Only two men remained well, and one of these had Mediterranean fever a year ago, and besides, had the advantage of a trip home. Seven, or 43·7 per cent., took Mediterranean fever, and the same number took simple continued fever—in several cases suspiciously like a mild attack of Mediterranean fever.

The working of 20A Ward has always been, in my experience, a difficult business, but with the ever-increasing incidence of Malta fever amongst the troops, it has been especially hard during the last two years. The facts I have brought forward should be sufficient to show that there must be something either in the ward itself or in the conditions of work of the orderlies to account for the large amount of sickness amongst them. If it were in the ward itself, one would expect that the nursing sisters should also suffer. This, however, is not the case, as there has been no case of Malta fever contracted by a nursing sister in 20A Ward for at least the last four to seven years. They all get run down during the summer and suffer from an occasional attack of simple continued fever. We must therefore look to the conditions of work, and to the difference

between a sister's work and an orderly's. An orderly comes in much closer contact with the patients in handling, moving and making the beds; he does the cleaning up and the removing of excreta. He also does his month's (in many cases last year two months') tour of night duty, and this, besides being a very trying and exacting duty in 20A Ward, exposes him to the attack of infected mosquitoes and biting insects. In this connection I may mention that I caught a mosquito in 20A which contained the *Micrococcus melitensis* in considerable quantity. Four men fell sick with Mediterranean fever while on night duty in 20A. The night sister's duty is performed by two temporarily employed civilians, who take by turns a month's duty at a time. One of these nurses contracted Mediterranean fever and enteric in the beginning of this year, and soon after coming off a tour of night duty. It has been very noticeable to me when working in this ward how, as the summer progressed and the work got really hard, the orderlies got run down in health and anæmic, listless and careless, and, as one after the other took sick, dispirited, and all but demoralised. They were thus doubly exposed to infection, first, by their increased susceptibility through ill-health, and second, by their own carelessness and slackness in observing the rules for personal disinfection. I therefore submit that all the evidence here brought forward goes to prove that infection is (1) possible by contact with patients and their excretions, and (2) probable through the medium of mosquitoes.

District Staff.—Living in hospital. Two cases out of a strength of ten.

Case 6.—A Sergeant employed in the Public Health Laboratory as assistant to the Mediterranean Fever Commission. He believes that he became infected while carrying out some experiments with artificially infected material. This is quite possible.

Case 16.—A clerk working in the Principal Medical Officer's office, but sleeping in the hospital barrack-room. No suggestions can be offered as to mode of infection in this instance.

Office Work.—Three cases out of a strength of sixteen.

Case 18.—Quartermaster-Sergeant, a steward in the hospital provision store, living with his wife and young daughter in the married quarters in the hospital quadrangle. Everything points in this case to infection in the quarters, as all three contracted the fever within a month and a half of each other, he being the last to become ill. The mosquito theory would best fit here.

Case 11.—A Corporal, employed in the Company office. This

man was in contact with a Private who contracted fever last year and never recovered properly, but was constantly ailing. This Private was employed in the same office, and was readmitted to hospital with a relapse of fever the day after the Corporal. This Corporal had also further contact in the barrack-room, which will be discussed further on.

Case 3.—A Private employed in the Principal Medical Officer's office. The only contact is that of a Private in the same office, who was readmitted to hospital two months previously with a relapse of fever.

I have summarised these facts regarding the occupation in the following table:—

		Average constant strength	No. of Mediterranean fever cases
Ward Work—			
20A	Nursing	6	6
	Assistant Nurses	5	1
	General Duty	4	2
All other Wards	Nursing	6	—
	General Duty	7	—
General Duty—			
	Orderly N.C.O.	1	2
	Dispensary	3	—
	Reg. Institutes	3	—
	"On Command"	3	—
	Pioneers	7	—
	Special Latrines	4	5
Office Work—			
	Senior Medical Officers' Office	5	1
	Quartermaster's and Company Office, Steward's Store	10	2
	Telephone	1	—
Cooks		5	2
District Staff		10	2
	Total	80	23
	Constant Sick	5·71	
		85·71	

The points that stand out pre-eminently with regard to occupation and its relation to Malta fever are: (1) Duty in 20A Ward, especially nursing and night duty; (2) cleaning latrines, especially those connected with Mediterranean fever wards.

Quarters.—Classified according to quarters occupied, the cases were:—

(*a*) One in Married Quarters, Hospital Quadrangle.
(*b*) Two in Married Quarters, Camerata, outside Hospital.
(*c*) Twenty in Hospital Barrack-room.

(*a*) This is Case No. 18, already mentioned. Infection probably caught in quarters. (*b*) Case No. 1, already mentioned. Infection can be traced to the quarters. Case No. 4, already mentioned. Infection in this case probably contracted in hospital, as he had been living in these quarters for two years. (*c*) Hospital barrack-room. This room has accommodation for sixty Non-commissioned Officers and men, and has been taxed to its utmost during the year. During the summer months many men sleep on the roof and on the verandah outside; and during the last three months of the year an additional room was appropriated to meet the demand for extra accommodation. The following is a plan of the barrack-room and the numbers correspond to the numbers on the list of cases given above, and mark the position of the man's bed when he fell sick.

The cases which seem to bear relationship to each other and which call for remark have been grouped and lettered.

A.—Non-commissioned Officers' Bunk.—These three cases occurred with an interval of a month between each.

Case 6.—May 12th. (See under District Staff.)

Case 9.—June 4th. (See under General Duty.)

Case 11.—July 10th. (See under Office Work.)

These might be accounted for by mosquitoes or by contact. No. 11 had also a contact in his office.

B.—Night Duties Bunk.—A great number of cases seem to have come from this bunk, and it looks at first sight as if something might be found here. When on night duty the man sleeps from nine to four during the day, so that they should not be so liable to be bitten by insects while asleep. There is nothing in the room to suggest a source of infection, and at the same time it will be noted that no case occurred alongside the bunk, and during the summer thirteen men slept on the verandah just outside this bunk, and only two of these contracted fever. Therefore, I think that the illness of these men had relation to their special work.

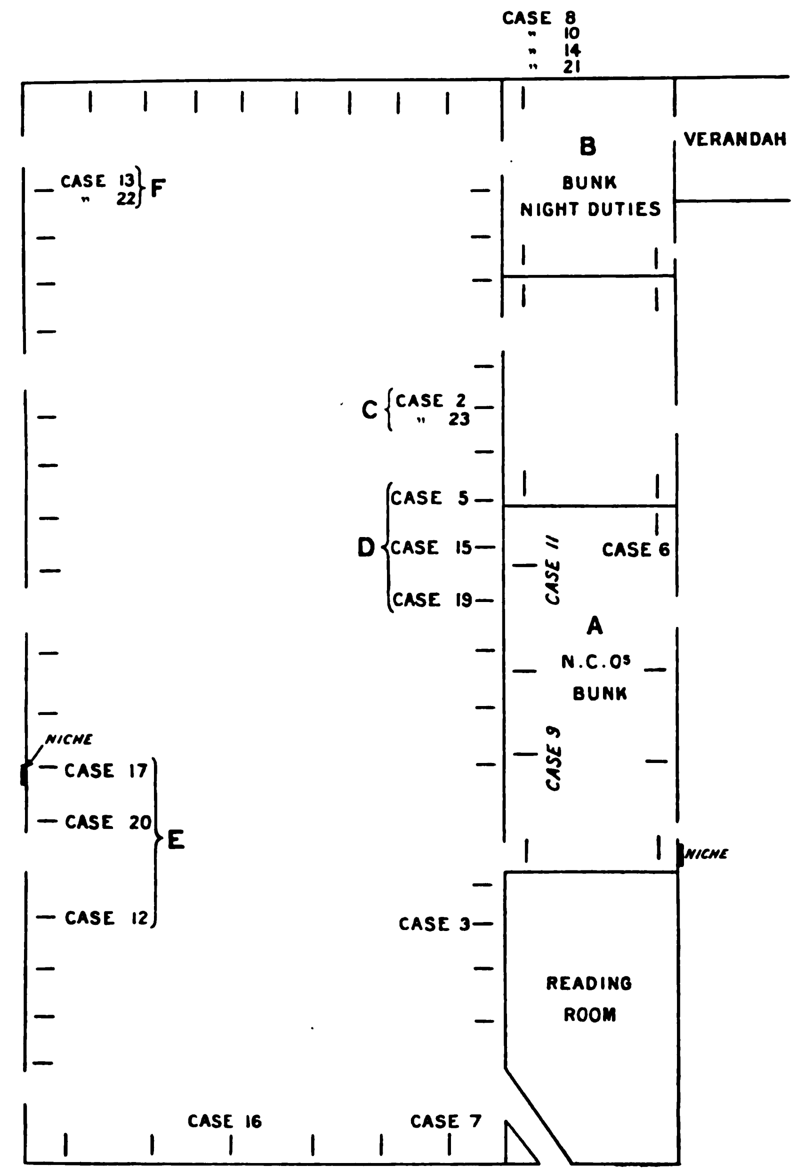
Case 8.—Took ill May 30th; two and a half months' nurse 20A Ward in 1905.

Case 10.—Took ill June 21st; five months' nurse 20A Ward in 1905.

Case 14.—Took ill July 27th; six months' nurse 20A Ward in 1905.

Case 21.—Took ill September 17th; four months' nurse 20A Ward in 1905.

C. — These two cases occurred in January and November respectively, so that no connection can be traced.


CASE 8
" 10
" 14
" 21
B
BUNK
NIGHT DUTIES
VERANDAH
CASE 13
" 22
F
C
CASE 2
" 23
CASE 5
CASE 15
CASE 19
D
CASE 11
CASE 6
A
N.C.Os
BUNK
CASE 9
NICHE
CASE 17
CASE 20
CASE 12
E
NICHE
CASE 3
READING
ROOM
CASE 16
CASE 7

D.—*Case* 5.—Took ill May 11th.

Case 15.—Took ill August 3rd; 20A Ward Latrine.

Case 19.—Took ill September 6th; nurse 20A Ward.

There is a possible connection between the last two.

E.—*Case* 12.—Took ill July 18th; general duty, 20A Ward.

Case 17.—Took ill August 7th; latrine, 20A Ward.

Case 20.—Took ill September 10th; latrine, 37 Ward.

These three cases struck me as being noteworthy on account of the fact that they are grouped round a certain window and close to a niche in the wall, in which I was almost certain of finding mosquitoes when hunting for them in the mornings. The men complained of the number of mosquitoes which came in by the window from the Maltese houses across the street. A similar niche and a favourite resort for mosquitoes is the corner of the Non-commissioned Officers' bunk. At the same time, Cases 17 and 12 slept during most of the summer, one on the verandah, and one on the roof of the hospital.

F. — *Case* 13. — Took ill July 27th; general duty, 20A Ward.

Case 22.—Took ill October 2nd; general duty, 20A Ward.

There is nothing to suggest that the second contracted infection from the one who occupied this position first.

Habits, Eating and Drinking.—There is no indication one way or another that makes one consider it necessary to enlarge on this subject; except perhaps, to emphasise the danger of infection through neglect of personal disinfection. In connection with the possibility of infection by means of unboiled milk, the milk used in the coffee bar has been found to be not always boiled. I have examined this milk on several occasions, but never found the *M. melitensis* present in it.

Exercise.—Among the victims of the fever are those of the most sedentary habits and those of the most active. The only man mentioned in my list of those employed in 20A Ward, on April 1st, who did not have any sickness, is a man who takes no exercise except swimming in the summer, who is of very temperate habits, and who sleeps on the roof regularly all through the summer.

Conclusions.

The facts in this paper require very little comment, as they speak for themselves. I merely sum up with a few remarks on the different sources of infection in relation to these preceding facts.

Infection by Milk.—The possibility of this must not be entirely disregarded.

Direct Infection from Contact with Patients and Contact with Infected Matter.—The evidence here is fairly conclusive, viz., the nursing orderlies in 20A Ward and those employed in latrines. Case 1, the father of a child suffering from Mediterranean fever, and also the Non-commissioned Officer in the Public Health Laboratory working with infected matter.

Transmitted Infection by Means of Mosquitoes or Biting Insects.—The evidence for this is also very strong, *vide* the cases occurring in 20A Ward amongst the Orderlies on night duty, the grouped cases in the barrack-room, and the case of the Quartermaster-Sergeant, No. 18. At the same time, I might mention that in the Women's Hospital, the two Nursing Sisters contracted fever within a short time of each other. These two sisters sleep on the premises of the Women's Hospital, but live and mess during the day with the Q.A.I.M.N.S., on the other side of the hospital quadrangle; none of these latter contracted fever. The senior of these Sisters had an attack of fever suspiciously like Mediterranean fever, though she never reacted. She blames the bite of a mosquito, which she said had just been feeding on one of the Malta fever patients. The other Sister had a typical attack of Malta fever in June. In this connection it is to be remembered that two consecutive Orderlies employed here contracted the fever. Other cases that I have mentioned as possibly coming under this category are Case No. 11 in the Company office, and Case No. 3 in the Senior Medical Officer's office.

The cause of all these cases can thus be speculated on and in many the evidence is very strong. Precautionary measures must therefore be taken to combat these causes of infection; but, at the same time, it must be remembered that the maintenance of the individual in sound health is the first essential, and that is practically impossible with the conditions that obtain at present, as regards the work and general surroundings of those employed in Valletta Hospital.

THE PATHOGENIC MOSQUITOES OF JAMAICA.

By Major F. M. MANGIN.
Royal Army Medical Corps.

The importance of the Culicidæ as carriers of the essentially "tropical" forms of disease is, as I know, fully realised by all the officers of the Corps. Here, in Jamaica, one has unequalled opportunities of making the acquaintance of certain species of this group of the diptera, each of which in itself is the carrier either of malaria, filariasis, or yellow fever, respectively. The species alluded to are, *Culex fatigans*, the carrier of filariasis,[1] *Stegomyia fasciata* and *Stegomyia mosquito* (Robineau-Desvoidy), the carriers of yellow fever, and the five species of Anopheles found in this island. These are: *Anopheles punctipennis, Arribalzagia maculipes, Cellia argyrotarsis*, and *Cyclolepidopteron grabhamii*, together with *Cellia albipes*, the commonest form of Anopheles. In addition there are numerous other species of Culex, but as these are not yet proved to be pathogenic, I do not intend to take futher notice of them. They are a source of annoyance, as many of them are vicious biters, but they have been so admirably described in the monograph on the "Culicidæ of Jamaica," by Drs. Grabham and Theobald, that I would refer those desirous of further information to that work.

The method of working I have adopted has been to collect water containing "wrigglers" in wide-mouthed quart bottles. The neck is guarded with a piece of gauze, to prevent the escape of the mature insect, and the edge of the bottom of the bottle smeared round with a half-inch ring of carbolised vaseline to prevent ants gaining access to the interior. Ants are extremely fond both of mosquito larvæ and the fully developed insect. It is astonishing to see the skill the ant displays in catching these; he crawls to the edge of the water, and seizes the larva by the respiratory syphon, or the mosquito by a leg, drags him, or her, away up the side of the bottle, and devours the insect with the help of his companions. An important point is the depth of the water in the bottle. In the larval stage the insects have to go to the bottom to feed; if the

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[1] The author assumes throughout that in filariasis the actual infection by the mosquito has been proved. There is, however, no good experimental evidence, and the most that can be said is that this mode of infection is probable, though there are anatomical difficulties.—Ed.

depth exceeds six inches they will not descend readily, and in consequence die off rapidly. Another important point in breeding out larvæ is to place some nitrogenous food in the breeding medium, such as small pieces of meat, dead insects, &c. If this is not done, the larvæ prey on each other, and on more than one occasion, before I learnt the importance of this fact, I found that nearly all my larvæ had disappeared, as they had been devouring each other.

Again, in collecting larvæ, it is worth while remembering that it is no use to take water from pools or ponds of any depth over four feet. The larvæ cannot get their food at a depth of over three to six inches. Again, ponds covered with duckweed, or containing confervæ, never yield "wrigglers," as in addition to preventing the larvæ getting to the surface to breathe, collections of water of this description invariably contain the predatory larvæ of the water-beetle and the dragon-fly, in addition to others which feed voraciously on the larvæ of the diptera. It is hardly necessary to point out that no larvæ will be found in collections of water which contain small fish, provided, of course, that the edges of the pool or pond are not overgrown with weeds, through which the fish cannot penetrate. Minnows and small fish of all varieties feed eagerly on larvæ, and as I have found from experience in India, these are the best agents for ridding standing collections of water of the larvæ of diptera contained in them. The larvæ of Anopheles and Culex, in my experience, as regards this island, require different surroundings to hatch out in satisfactorily. That of Anopheles prefers clear, clean water, that of *Culex fatigans* and Stegomyia will flourish in absolutely foul and offensive water. I have introduced the larvæ of Anopheles into foul water swarming with the larvæ of *C. fatigans* and Stegomyia, and none attained the pupal stage. I have never succeeded in finding Anopheles larvæ except in clear, shallow rain-pools, or pools formed by dripping taps, such as one finds in the gardens surrounding houses and quarters in barracks. On the other hand, Stegomyia and *C. fatigans* larvæ are found abundantly in any collection of water, in old tins, disused pails, broken bottles, &c. In hatching out larvæ, the bottles containing them should be kept in a shaded place, and not exposed to bright light. Normally the fully developed insect changes from the pupal stage to that of the imago in the evening, *i.e.*, after sunset. If the larvæ are kept exposed to light, they undoubtedly develop less rapidly, and the fully developed insect emerges in the daytime, with the result that it is overcome by the light, and is drowned before it can clear its wings and fly. This is a fact I

have noticed repeatedly. It makes all the difference to the number of perfect insects one obtains from a brood of larvæ if they are kept in a darkened situation during their transformation from the pupal stage to that of the imago. When the perfect insect has emerged it should be removed from the breeding bottle to a dry, wide-mouthed bottle, in which is subsequently suspended a fresh piece of banana, or raw, juicy meat. The transference is easily effected by removing the gauze cover, giving the bottle a rapid twist, at the same time inverting the dry bottle over the mouth of the breeding-bottle. The insect will fly up into bottle No. 2, a piece of cardboard is then placed beneath it as it is removed. The banana is suspended in the bottle by a piece of thread, and the mouth closed by a piece of gauze or muslin. The imprisoned insects soon begin to feed, and subsequently copulate. If water, to about the depth of one inch, be poured in, the females will lay their eggs within twenty-four to forty-eight hours (the males dying at the end of this period), and the development of the insect may be followed throughout its successive stages, from the egg to the imago.

As regards the extermination of mosquitoes, the practical deductions from the facts I have narrated are these: (1) In deep water, *i.e.*, water of over three feet deep, mosquitoes cannot readily develop. It is in the shallow water at the edges of the pond that they can reproduce themselves, so that in dealing with large ponds or pools, it is essential that their edges be deepened to at least two feet, so that the sodden margins of the area dealt with may be thereby drained. (2) Collections of water covered with duckweed, or containing confervæ or spirogyra, need not be dealt with. If the mosquito lays her eggs in such situations, the larvæ are not likely to attain maturity, as they are either devoured by the predatory larvæ of other insects which flourish in such collections of water, or become entangled in the strands of the confervæ, and are thus unable to reach the surface to breathe. (3) It should be borne in mind (as pointed out by J. B. Smith, Entomologist to New Jersey, U.S.A.) that though larvæ will not develop readily in bright light, neither will they do so in dense shade, so that pools, &c., overgrown with tall water-plants, such as bulrushes, cat-tails, and so forth, which cut off the light of day from the water in which they grow, are not likely to afford a breeding ground for mosquitoes. (4) From my own experience in India, as mentioned previously, I have no doubt that fish, more especially the smaller varieties, such as minnows, &c., are the most efficient destroyers of mosquito larvæ.

In one station, in which I did duty for fifteen months continuously, the bungalow which we occupied was at first swarming with various species both of Anopheles and Culex. In the garden there were three shallow irrigation tanks which contained larvæ of both species in abundance. I imported minnows from the Indus, a few miles off, and within a month the bungalow was free of the pests. It is hardly necessary to point out that fish cannot exterminate larvæ if they are put into ponds the edges of which are shallow and overgrown with weeds, and through which the fish cannot pass to reach their prey. (5) As regards the use of mineral oil, it is worth while remembering that the oil not only kills the larvæ by preventing them from coming to the surface to breathe, but also acts as a direct poison on the females, if they attempt to deposit their eggs on water covered with a film of paraffin. This fact has been conclusively proved by experiments made in New Jersey, U.S.A., under the auspices of J. B. Smith, Entomologist to the State. He has also demonstrated that one ounce of kerosene oil sprayed over water will efficiently protect fifteen square feet of surface.

The commonest variety of mosquito met with in Jamaica, and the most obtrusive, on account of the fact that it bites viciously throughout the day as well as the night, is the *S. fasciata*, together with its closely allied congener, *S. mosquito* (Robineau-Desvoidy). The two species are very similar in appearance. Even to the naked eye they are handsome insects, the body and legs, banded with black and white stripes, reminding one of a piece of shining ebony set with pearls. Under the microscope with a half-inch objective, the beauty of the insect can be still more realised. The *S. fasciata* differs from the *S. mosquito* in that the former has two median parallel yellow lines on the thorax, which are absent in the latter. The Stegomyia is a domestic species, breeding readily in the neighbourhood of dwellings, in water-barrels, tins, broken bottles, &c. It feeds mostly in the early afternoon, between mid-day and four p.m., but, as mentioned above, the members of this species will attack one practically at any hour of the day or night. They are formidable insects, owing to the fact that the females, which alone bite, are good travellers, and have been known to live for sixty-five days or more in captivity. I have had specimens brought to me in Jamaica, from the Spanish main, which though corked up in a one-ounce bottle without food of any sort, reached me alive at the end of two weeks. As *S. fasciata* is the undoubted carrier of yellow fever, its vitality emphasises the

importance of taking all possible measures to prevent their transference from their present habitat to countries such as India proper, where a population possibly susceptible to yellow fever exists. The "wriggler," or larva of this species, can be readily identified by the fact that the respiratory syphon, or air-tube at the tail, is thick and very short, and that the transverse diameter of the head is smaller than that of the thorax, in contrast to the larvæ of *C. fatigans*, which spend most of their time at the surface, and whose respiratory syphon is thin and elongated, with a head equal in diameter to that of the thorax.

The larvæ of Stegomyia remain at the bottom of the collection of water in which they live, and only occasionally rise to the surface for air. Being members of the Culex family, they of course, when at the surface of the water, rest in a vertical position, *i.e.*, head down, as contrasted with the Anopheles, which assume a position parallel with the surface. This rule as regards the "surface" position of the larvæ of these two sub-families is of great practical value, but to every rule there is an exception. In Jamaica it is exemplified in the case of *Grabhamia jamaicensis*. This mosquito is a true Culex, and I may add a vicious biter, but its larvæ is often found floating on the surface in an approximately horizontal position; on close observation one can see, however, that it differs from the larvæ of Anopheles, in that the middle segment of the body hangs down, curved like a piece of slack rope, between the head and the respiratory syphon.

C. fatigans is, next to the Stegomyia, the commonest variety of Culex found in the island. This insect, although it breeds in similar situations to those in which the Stegomyia reproduces itself, differs from it in that, while the latter is active both by day and night, the former makes itself evident at night only, *i.e.*, after sunset. The imago is a dull, brown-coloured mosquito, and is often confounded with Stegomyia, as white spots (not bands) are present on the apices of the tibiæ and femora, in contrast to the Stegomyia, in which the legs are obviously black and banded with white at these situations. Again, the female of the Stegomyia lays her eggs singly, while those of the *C. fatigans* are laid in "rafts." Their flight is quite distinct from that of Stegomyia or the various varieties of the Anopheles; both of these fly in a straight line from one position to another, while *C. fatigans* flies in a series of undulating curves, which when once recognised makes it easy to identify the latter. As it is a domestic species, and a weak flyer, it is easy to destroy it in the larval stage.

Five species of Anopheles were met with in the island. Those most commonly met with in this part of the island, *i.e.*, Kingston and Up Park Camp, are *Cellia albipes*, *argyrotarsis* and *Cyclolepidopteron grabhamii*. The remaining two species, *Arribalzagia maculipes* and *Anopheles punctipennis*, are only found in the north-east and north-west districts of the island. These species as a whole are very rare; for seven months continuously I collected larvæ from collections of water in pools, bottles, tins, &c., and though I obtained many most interesting specimens of Culex larvæ, I only became the fortunate possessor of less than two dozen specimens of Anopheles; these were all *Cellia albipes* and *C. argyrotarsis*, with one example of the species discovered by Dr. Grabham, of Kingston, in this colony, the *Cyclolepidopteron grabhamii*, so called on account of the curious pear-shaped scales on the wings of the mature insect, which are only found in this species of Anopheles. The larvæ seem to require more air than those of Culex, as they only descend to the bottom of the breeding bottle when disturbed, in marked contrast to the Culex larvæ, which are to be found constantly feeding beneath the surface, rising from time to time to breathe. The eggs again are laid singly, and float lengthwise, though they may often adhere in small masses. The eggs of the majority of the Culex float, as a rule, on end. The larvæ of the Anopheles have the curious habit of harmonising themselves with their surroundings as regards colour, and may be easily mistaken for floating particles of vegetable *débris* or rubbish, until actually touched. As far as my experience goes they are not cannibalistic, as are the larvæ of the Culex.

The appearance of the mature insect is unmistakable. Owing to its large palpi and proboscis the anterior extremity of the mosquito is torpedo-like in appearance. Its attitude, when resting, with the head placed between the forelegs and its body at right angles to its resting place, makes it at once recognisable. A point not often emphasised, but brought to notice by J. B. Smith, of New Jersey, U.S.A., I have verified by many observations. This is, that in Anopheles, when the insect is at rest, the hindlegs are held high in the air and extended beyond the body. In Culex, on the contrary, the hindlegs are curved over so that the ends of the feet almost touch the body. The rarity of this variety of the Culicidæ in Up Park Camp, the cantonment of this colony, may be realised by the fact that true cases of malaria are quite uncommon,[1] and the

[1] Is this a legitimate inference ?—Ed.

few that present themselves are mostly soldiers who have recently returned from the West Coast of Africa, or men who have contracted malaria elsewhere, either in India or in the malarious districts of this island. Cases which, before the days of microscopical blood examination, were returned as ague, or simple continued fever (of which many, even now, present themselves), and in whose blood no malarial parasites are found, are, in my opinion, undoubtedly cases of so-called paratyphoid, the result of infection by a colon bacillus, or some blood parasite, bacillary or protozoal, not hitherto discovered. Such cases do not react to quinine, and must be familiar, especially in India, to many officers who have served in that empire.[1]

As regards the habits of the Anopheles found in this station, they are all night-fliers, concealing themselves by day in dark corners, outhouses, cupboards, and on dark-coloured clothing. Owing to the development of the head appendages, fortunately for humanity, they cannot travel far, their limit being from half to one mile at the utmost. Of course, this does not take account of the help they may obtain in their flight from prevailing winds, and the possibility of conveyance in railway trains, vessels, vehicles, &c., must also be borne in mind. They do not bite so viciously as the various species of Culex, and hence often escape after attacking one, whereas the Culex, owing to the discomfort at once evident on its attempting to bite, draws attention to itself, and with a little practice on the part of its victim is easily killed.

From the preceding short and, I am afraid, imperfect sketch of the three varieties of mosquitoes I have attempted to describe, I have omitted purposely any approach to a detailed description of the anatomy of the larvæ or the mature insect. This is of a purely technical matter and uninteresting to any but those who have studied the diptera thoroughly. As it is obviously a matter of great importance to be able to recognise these enemies of mankind in their various stages, I have taken upon myself to place on record the facts that have been noted after several months' study, both of the larvæ and the perfect insect of these species of the Culicidæ, and have therefore ventured to describe them in this article.

[1] A good many of the so-called simple continued fevers in India do show a malarial parasite, and the same has been observed in St. Lucia.—Ed.

REGIMENTAL SANITATION IN INDIA.

By Lieutenant J. A. BALCK.
Royal Army Medical Corps.

Any one who has been even only a short time in India must have been struck by the great difference in that country between the theory and practice of sanitation. While the origin of disease is clearly recognised, only spasmodic efforts are made to combat it. Numerous and excellent circulars emanate from various offices, but practical sanitation does not even approach the standard therein laid down.

This discrepancy calls for enquiry, and the explanation is, I think, a simple one. The recommendations are made by professional men, but the execution is left to laymen. It is like putting a delicate instrument into the hands of a tyro. Untrained as the regimental officer is in sanitary matters, he has, as a rule, only the faintest idea of the *raison d'être* of any suggestions made to him by his medical adviser. Often to him it is but a "doctor's fad" to be borne with, to be carried out perfunctorily if necessary, but to be quietly shelved later if possible. If he does take sanitation seriously he often, with the best intentions, either does something or leaves something undone, which renders the whole null and void. If this is true of the officers it is still more so of the men. The former are at least educated men who have heard of a bacillus, to the latter the whole matter is simply foolishness. It is but in rare instances that they trouble to conform to the simple sanitary rules laid down for their guidance. And from a class imbued with this spirit are drawn the "sanitary orderlies" who, without further training, are supposed to become efficient inspectors of nuisances. It is not to be wondered at that the results are not good.

Another drawback is the lack of unity in present-day sanitary administration. The Senior Medical Officer is nominally the Sanitary Officer of the Station, but his duties are so manifold that, though he may lay down principles, it is impossible for him personally to supervise details. This is left to the various medical officers in "sanitary charge" of units. These must, and do, vary considerably in the way in which they carry out their duties. Some who are especially interested in sanitation are continually finding out defects and pressing the Commanding Officer for reforms. Others, whose tastes

lie in different directions, are content with that minimum of cleanliness which may be attained by a weekly inspection at a fixed hour. Moreover, owing to the frequent moves in India, medical officers in charge of units are being continually changed. A "keen" man succeeds a "slack" man, and *vice versâ*, until bewildered by the multiplicity of his advisers, the Commanding Officer seeks refuge in a masterly inactivity by which he seeks to tide over a reforming period in the hope that the reformer's successor may be less zealous. Not only is there thus *per se* great inequality in the condition of the various lines, but a heavy drag is put on sanitary progress. In but too many cases also has this experience of the variability of our professional opinion reacted unfavourably on the estimation in which it is held. In short, the drawbacks of a regimental system of sanitation appear almost as great as those formerly associated with regimental hospitals. Is, as a matter of fact, the one system more defensible than the other? The Station Hospital has replaced the various regimental ones with conspicuous success. The natural corollary, and one which I venture to think would prove equally successful, is to replace the regimental sanitarian with his casual sanitary orderly by a "Station Sanitary Officer" with a staff of trained inspectors.

There should be little difficulty in finding suitable men for the position of "Station Sanitary Officer," or, as I shall call him in this paper, "Medical Officer of Health." All officers of the Royal Army Medical Corps have to pass through a sanitary course at the College, and there will probably always be sufficient men who, though not necessarily in possession of a diploma in Public Health, have the knowledge and the tastes to undertake *con amore* the duties of a Public Health Officer. The case is far different with the remainder of the proposed Station Sanitary Staff, the "Sanitary Inspectors." There is absolutely no provision in the Army for such a body of men, they would have to be created. There exists, of course, a scheme for providing a sanitary branch in the Royal Army Medical Corps, but the men of the Royal Army Medical Corps have not yet been authorised for India. Besides, it might not be amiss if, by throwing these positions open to all Non-commissioned Officers generally, a certain amount of sanitary knowledge became diffused throughout the Army.

The scheme I would propose is as follows: Twice or three times a year a sanitary course would be held at the Headquarters of the Division, by the Divisional Sanitary Officer. Each regiment would be required to detail a certain number of Non-commissioned Officers

and men to attend this course. Only those who had successfully passed through such a course should be eligible for certain positions, such as cook-house orderlies, soldier in charge mineral water factory, or Non-commissioned Officer in charge R.A.T.A. or coffee shop. From among the Non-commissioned Officers attending this course, those showing special aptitude should be selected for further instruction, to be given at Command Headquarters by the Commanding Sanitary Officer.[1] At the end of this course there would be an examination. Those men who were succcessful should be granted a certificate, wear a special badge, and draw, when employed, extra duty pay at the rate of 4 annas or more a day. They would be detailed for duty with Divisions, and be at the disposal of the Divisional Principal Medical Officer who would appoint them to stations. The Senior Medical Officer should have the right to fine them so many days' extra duty pay for neglect of duty, while for continued inefficiency the Principal Medical Officer should be able to return them to regimental duty. Otherwise, they should only be liable to be recalled with the sanction of the General Officer Commanding, and of course for active service.

Every year, in this manner, a certain number of men would be put through elementary sanitary training, while a few would go on to more advanced courses. By this ever-increasing body of men, the vast mass of ignorance and indifference, with which we have to struggle, might gradually become leavened. The important bearing this might have on active service I will discuss later; at present I will confine myself to the question of peace administration in a cantonment. The entire regimental lines would be divided into sanitary districts, which might or might not correspond to the boundaries of the various corps, and be administered by the Medical Officer of Health as a sanitary whole. This officer would have at his disposal a staff of Sanitary Inspectors, one for each district, and a fixed establishment of sweepers. Both Sanitary Inspectors and sweepers should be removable from one sanitary district to another, at the discretion of the Medical Officer of Health. He also would be the paymaster of the sweepers, which would include the right to fine or dismiss them. In this way the vast amount of correspondence at present necessary before a sweeper can be touched would be avoided. There should also be at the disposal of the

[1] If this latter course were made to correspond with the course for Sanitary Inspectors at home, recognition might be obtained for it, and so another career opened to old soldiers.

Medical Officer of Health a fixed allotment of money. Out of this would come the cost of all sanitary appliances and the pay of the sweepers, with a small margin for emergencies. It would probably also be convenient for the extra duty pay of the Sanitary Inspectors to be drawn through this channel. The duties of the Sanitary Staff should then be apportioned somewhat as follows:—

(1) *Sanitary Inspector.*—Placed in charge of a district he would be responsible to the Medical Officer of Health and not to the regimental authorities, for its cleanliness. He would have all nuisances removed by his sweepers. This would involve entire charge of all latrines and urinals, and general drainage and cleanliness of the lines, with special reference to cook-house refuse and wash-house waste water. He would have the right to inspect dairies and bakeries, and supervise the boiling of drinking water. Any sweeper neglecting his duty, he would bring before the Medical Officer of Health within twenty-four hours. He would keep a sanitary diary and send it daily for inspection to the office of the Medical Officer of Health.

(2) *Medical Officer of Health.*—This officer would by frequent visits satisfy himself as to the efficiency of his inspectors, inspecting at the same time officers' messes, barrack-rooms, interior of cook-houses, and regimental institutes. Any matter connected with the Sanitary Inspector's department which required improvement, the Medical Officer of Health would himself see to, about others he would communicate direct with the Commanding Officer of the unit concerned. He would be responsible for the precautionary measures on any outbreak of infectious disease. The Senior Medical Officer should therefore be required to notify every case occurring in hospital. The Medical Officer of Health would further medically inspect all drafts arriving at the station, carry out the medical arrangements for their isolation, and discharge them from quarantine. For this purpose every Commanding Officer should be required to give ample notice when a draft was expected. All anti-malarial measures would be under the supervision of the Medical Officer of Health. He would be the technical adviser of the Senior Medical Officer on all sanitary matters, but also be a member of the Cantonment Committee, in order to be able personally to explain his views. He would be required to keep accounts as to the disbursement of the allotment at his disposal and to keep a sanitary diary for inspection by the Senior Medical Officer. Should a laboratory be available, he might also be required to make such chemical and bacteriological investigations as concerned the public health.

In order that these duties may be performed efficiently it should be distinctly laid down that the Medical Officer of Health should not be available for hospital duty, or orderly duty, unless under exceptional circumstances, and then only with the sanction of the Principal Medical Officer (this rule would, of course, be modified in small stations where the number of medical officers did not exceed four. But even here it should be recognised that he was primarily a sanitary officer, and his hospital duties reduced to a minimum). To ensure continuity of administration, he should further be exempted from all out-station duty. In the hot weather he should be required to take leave, and not a hill station. Finally, as in the performance of his duties he has to cover much ground, he should draw horse allowance.

It will be noted that in the above scheme I have excluded barrack-rooms, regimental institutes, and the interior of cook-houses from the purview of the Sanitary Inspector. It is obvious that any attempt of a soldier of one regiment to exercise authority in the barrack-room of another corps would be failure. Cook-houses, which would require to be under the charge of regimental cooks, come under the same heading. As regards regimental institutes, including mineral water factories, regimental authorities might claim, with some justice, that those institutions which are run by regimental money should be under regimental control. If the right of inspection by the Medical Officer of Health were safeguarded, and, moreover, it were laid down that only those soldiers who had been through a sanitary course were to be placed in charge of institutes, mineral water factories, or cook-houses, this privilege might, I think, be safely conceded.

Were this scheme carried out the regiment would be somewhat in the position of a householder who has his streets swept and his nuisances removed by public authority, while guarding the privacy of his house. I do not think that, under these circumstances, there would be so much opposition as might be expected from regimental authorities. Many Commanding Officers would doubtless welcome the freedom from worry about the sanitary condition of their lines. To them the work is as uncongenial as it naturally falls in our sphere. Some malcontents there would, no doubt, be; but of what measure is it to be expected that it will content everybody?

I have so far only included regimental lines and matters usually left to the medical officers of each regiment, in my scheme. The sanitation of the residential part of the station and of the

bazaars has been usually in the hands of the Officer in Charge of the Cantonment Hospital. This arrangement might be left undisturbed, or these duties might also be transferred to the Medical Officer of Health. Unity of administration would be gained if this last course were adopted. Were Sanitary Inspectors placed in charge of this part of the station also, of course their duties would be considerably modified. The task of the Medical Officer of Health would be so much greater, and the duties of the Officer Commanding Cantonment Hospital so much lightened, that, in justice, a portion of the Staff pay of the latter should be transferred to the former.

There remains to be considered how this scheme of administration would adapt itself to active service conditions. The regimental Medical Officer would necessarily again take on the duties of Sanitary Officer for his unit. There would, however, be this important difference. With each regiment there would be one or more Non-commissioned Officers trained as Sanitary Inspectors, and a large number of men who had attended a sanitary class. While the former could look after the regiment's latrines and urinals, one or two of the latter in each company could be entrusted with the provision of drinking water for their company. That under these conditions the work of the sanitarian would be considerably lightened is evident, that disease might be diminished is, perhaps, not too sanguine a hope.

I am conscious that my scheme possesses many crudities, still, I have ventured to put it forward, as I believe that in the direction advocated there lies the true hope of sanitary progress.

SOME NOTES ON THE RESULTS OF ANTI-ENTERIC INOCULATION.

By Captain W. A. WARD.
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When one reviews the history of anti-enteric inoculation, one cannot but feel that this most important subject has, in common with all the great discoveries in medical and surgical science, had to contend with an amount of opposition and adverse criticism which it has not quite deserved. This is the more to be regretted since we may have at our hand a means by which the great destruction wrought by this disease (the worst of all enemies in the field) may be considerably lessened. It is, perhaps, easy to account for some of the opposition. First, the name "anti-enteric" at once leads both the professional and layman to expect complete exemption as a result of the inoculation. This has never been claimed for it by even its most ardent advocates. If it only mitigates the severity of the attack, something is gained, and I hope we shall soon learn that this is so.

Again, it is most unfortunate that the discovery was in its infancy just as the South African War broke out, and the result was that, as is only natural, the knowledge since gained was then wanting, and errors may then have been made in the application of the treatment which, if remedied, would have altered the result very materially.

Then as regards the statistics: figures are at all times misleading and unreliable, however much care may have been taken in their preparation. This applies especially to figures which were collected under conditions such as those which existed in the early part of the South African War. To name only a few of the possible errors: some of the figures published in connection with the Ladysmith garrison were afterwards found to be wrong, as officers who were returned as having died from enteric, after inoculation, should have been returned, in one case, from "wounded in action," and in the other, "not inoculated with anti-typhoid serum"; and whereas five officers were put down as having died of enteric, uninoculated, ten was the correct number; therefore, when we are dealing with small figures, it will be seen what a great difference they would make in the result. As the above came immediately under one's own notice, I, at the time, being in charge of the cases, and the names and

history of each one only too well recorded in one's mind, was then able to at once detect the error. If such errors occurred in one record, it is not too much to infer that there may have been many such errors, though quite unavoidable under the circumstances.

Then, again, when collecting the figures for the purpose of compiling the statistics, the patients suffering from enteric were asked: "Were you inoculated?" Many said "Yes," referring in their own mind to small-pox vaccination, which they could not differentiate from anti-typhoid vaccination, and some, especially officers and men of the yeomanry and irregular corps, said they were inoculated, having gone through some form of preventive inoculation at the hands of certain large chemists who prepared some form of vaccine, but the exact nature of which was not known, so it would be scarcely fair to regard them as having undergone anti-typhoid inoculation.

I offer the above as giving some possible explanation of the very wide differences in the results of inoculation which came home, and for the divergent views of many medical men, such as were expressed at a meeting of the Medical Society, London, 1901. But the figures were sufficiently encouraging that the Commission appointed to enquire into the whole question was able to recommend that further investigation should be made, with a result that certain regiments going to India were carefully inoculated and then kept under the supervision of experts, and results have come to hand which are very satisfactory.

As far as I know, no figures have yet been published of the results of inoculation in one particular regiment which had been the whole time under observation, but when ordered to South Africa on a second tour in November, 1901, I was fortunate in being placed in medical charge of the 7th Hussars, the Colonel of which was very anxious that the regiment should have the benefit of this protective treatment, and though the figures are necessarily very small, they are distinctly encouraging. The temperature charts of those men inoculated and who contracted enteric are given, and reference to them will show how very mild was the attack in most of the cases, so that it is quite possible that by some medical officers they would not have been diagnosed as enteric, when they had only the clinical symptoms to go on and had no laboratory aid to help confirm the diagnosis. But even including these very slight cases of fever as cases of enteric after inoculation, the figures are still favourable to inoculation. The history of the inoculation and the results in this regiment are as follows:—

The regiment embarked at Southampton, November 30th, 1901, with a strength of 26 officers, 524 N.C.O.'s and men. The original intention was to do the first inoculation before leaving Aldershot, but many difficulties stand in the way of this when a regiment is about to proceed on active service, not the least of which is the desire of the men to have the last few days to themselves and be fit. Accordingly, the two inoculations were performed during the voyage, but on a voyage occupying twenty days it is difficult to get the two inoculations in and leave the desired interval between the two. At any time life on the troop-deck is a poor one, and many men hesitate to add indisposition to this, while if the voyage is at all a rough one, there are difficulties not only in performing the inoculation, but a man at all inclined to sea sickness shies the inoculation. For these reasons I think it desirable that at least one inoculation be done before embarkation, and as early as possible after the regiment is placed under orders for foreign service.

Numbers Inoculated.—Out of the 26 officers and 524 N.C.O.'s and men who embarked, 20 officers, 213 N.C.O.'s and men were inoculated twice, and 73 N.C.O.'s and men were inoculated once, leaving six officers and 238 N.C.O.'s and men uninoculated. Of these six officers, three were over 30 years of age and had already been on active service. One had already had enteric fever.

Dose.—The first dose was one of 0·5 cubic centimetre of vaccine fluid supplied by Professor Wright, and the men were done in batches of twenty to thirty a day, as having horses on board it was not desirable to incapacitate too many at one time. The resulting indisposition was in most cases almost *nil*, and very few suffered any inconvenience.

The second dose, after an interval of eight days, was 1 cubic centimetre, and the resulting reaction was again very slight; in no case did the temperature rise above 101° F., and, except in a few cases, the men were at their work on the third day after inoculation. It was noticed that the general reaction was more marked in those who had previously had enteric fever, and the reaction least marked in those who were big smokers.

Itinerary.—The regiment arrived at Cape Town, December 20th, 1901, and after a few days' stay there entrained to De Aar, where it remained, camped, till January 13th, 1902. It then trekked to Norval's Pont, arriving there January 20th. The following day it entrained for Winburg, Orange River Colony, where it remained

encamped till February 4th. A column was then formed, consisting of 7th Hussars, 2nd Dragoon Guards, Royal Artillery and others. From February 4th, for the next three months, the regiment was more or less on the trek every day, taking part in the "drives" in the Orange River Colony, and occasionally putting into places for supplies.

On March 10th the regiment crossed the Vaal River into the Transvaal, and was engaged in the "drives" in the Eastern Transvaal, occasionally putting into Springs, Heidelburg, Balmoral, Vlakfontein, &c. On May 4th it recrossed the Vaal into the Orange River Colony, and was engaged in the big and final "drives" of the war. On May 16th the regiment was again at Heidelburg, and has remained there up to the present date, June 20th, 1902. It will thus be seen that the regiment has been under every condition of treking and in towns, during the six months which the Report covers.

Cases of Enteric.—The first case of enteric occurred February 17th, 1902, in a man once inoculated, and two months after the date of inoculation. It would appear to have been of a very mild case and by some would scarcely have been called one of enteric fever. The Medical Officer in charge of the case wrote: "Elliott, I should say, had an undoubted attack of modified enteric, his tongue and stools being typical for twenty-four hours" (see chart H).

In all there had been twenty-nine cases of enteric during the six months; six in those inoculated twice; three in those inoculated once; twenty in those uninoculated. No officer contracted the disease.

Deaths.—There were three deaths from enteric, all among those uninoculated.

Time of Contracting Disease after Inoculation:—

In the twice inoculated.	*Time after inoculation.*
One sickened March 9th, 1902	3 months.
,, ,, ,, 29th, ,, ...	3½ ,,
,, ,, April 7th, ,, ...	4 ,,
,, ,, ,, 23rd, ,, ...	4½ ,,
,, ,, May 8th, ,, ...	5 ,,
,, ,, ,, 22nd, ,, ...	5½ ,,

In the once inoculated.	*Time after inoculation.*
One sickened February 11th, 1902	2 months.
,, ,, ,, 22nd, ,, ...	2½ ,,
,, ,, April 11th, ,, ...	4 ,,

In the uninoculated.	*No. of Cases.*
First month after arrival	*Nil.*
Second ,, ,,	2
Third ,, ,,	5
Fourth ,, ,,	6
Fifth ,, ,,	5
Sixth ,, ,,	2

It is interesting to note that the average time of contracting the disease after inoculation works out as follows:—

In those once inoculated	2 months 25 days after inoculation.
Grouping all those inoculated	3 ,, 24 ,, ,, ,,
In those uninoculated	3 ,, 10 ,, ,, ,,
In those twice inoculated	4 ,, 7 ,, ,, ,,

TABLE SHOWING STRENGTH, NUMBER INOCULATED AND UNINOCULATED.

	Total strength	Inoculated twice	Inoculated once	Uninoculated
Officers	26	20	—	6
Non-commissioned Officers and men	524	213	73	238

CASES OF ENTERIC FEVER BETWEEN DECEMBER 20TH, 1901, AND JUNE 20TH, 1902.

	Officers	N.C.O.'s and men	Percentage	Deaths
Inoculated twice	*Nil*	6	2·34	*Nil.*
,, once	,,	3	4·10	,,
Uninoculated	,,	20	8·40	3

The incidence of enteric for the whole regiment, including officers, 5·2 per cent.

Case mortality in inoculated	*Nil.*
,, ,, uninoculated	15 per cent.

Draft of 48 men arrived from Cape Town, April 13th, 1902, uninoculated:—

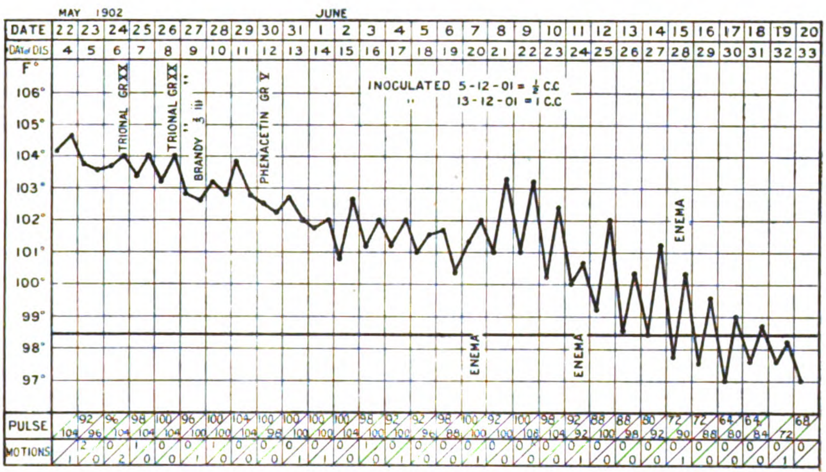
Cases of enteric (2 months)	Deaths	Percentage of cases
4	1	8·3

Notes on Cases Inoculated.—By the kindness of medical officers under whom the cases of enteric fever came for treatment, I am able to publish notes of those cases which occurred in the inoculated, and they are of considerable interest.

In all, constipation would appear to have been a prominent symptom, while the range of temperature appears to have varied much. One case, Private Eckington, twice inoculated, was reported as dangerously ill (Chart A).

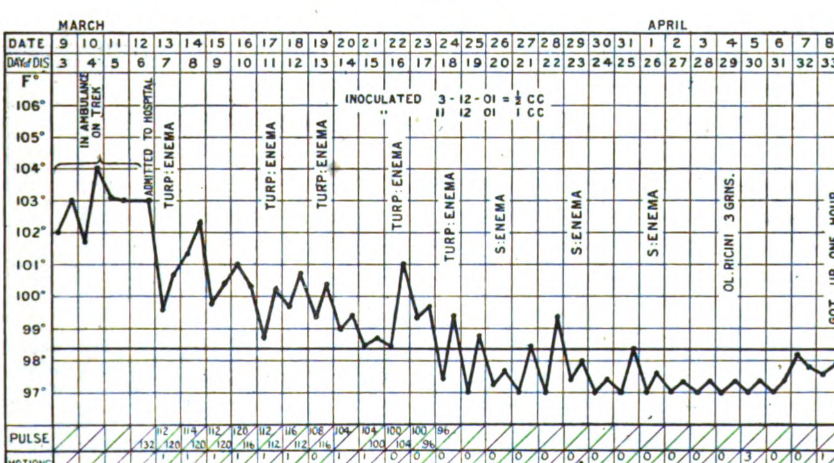
TEMPERATURE CHART—A.

Corps, 7th Hussars. *Hospital Station*, No. 5 Stationary, Heidelburg.
No. 4531. *Rank and Name*, Private G. Eckington. *Age*, 23. *Service*, 3 years.
Disease, Enteric Fever. *Date of Admission*, May 22nd, 1902.



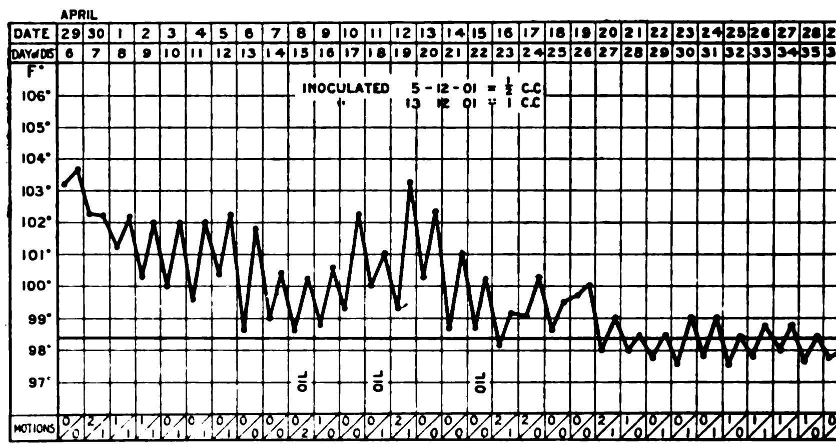
CLINICAL CHART—B.

Corps, 7th Hussars. *Hospital Station*, Heidelburg. *No.* 5569.
Rank and Name, Private F. Jones. *Age*, 20. *Service*, 1 year. *Disease*, Enteric Fever.
Date of Admission, March 12th, 1902. *Date of Discharge*, May 9th, 1902.
Result, Recovered.



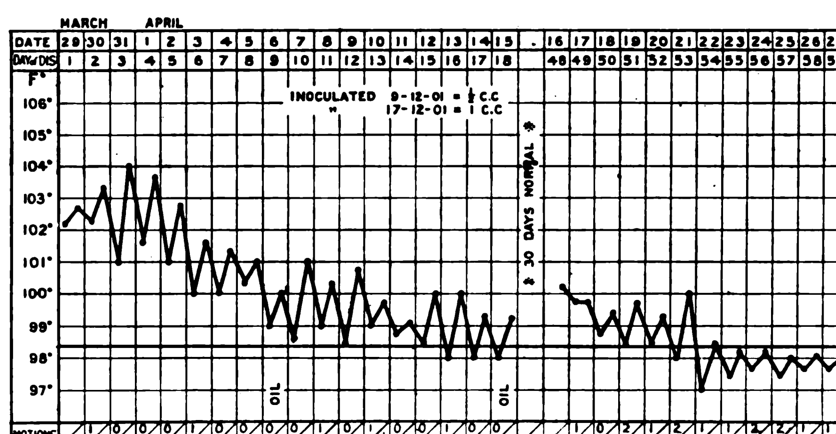
Clinical Chart—C.

Corps, 7th Hussars. *Hospital Station*, No. 16 General, Elandsfontein.
No. 3946. *Rank and Name*, Private W. Comfort. *Age*, 30. *Service*, 9 years.
Disease, Enteric Fever. *Date of Admission*, April 29th, 1902.



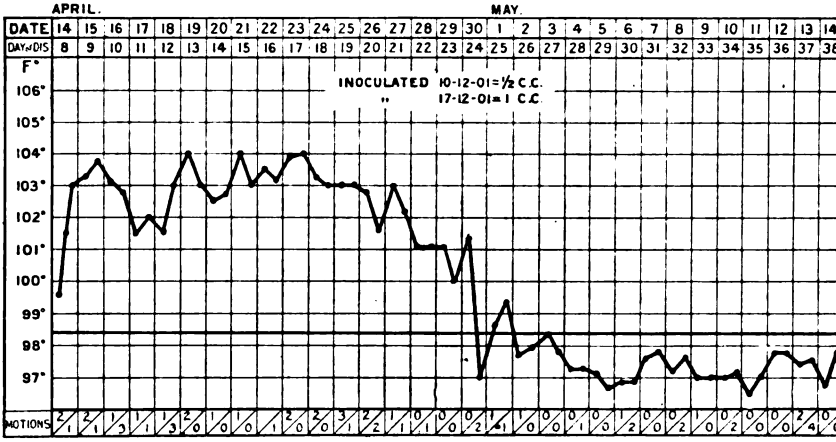
Clinical Chart—D.

Corps, 7th Hussars. *Hospital Station*, No. 16 General, Elandsfontein.
No. 4449. *Rank and Name*, Private E. Watts. *Age*, 22. *Service*, 3 years.
Disease, Enteric Fever. *Date of Admission*, March 30th, 1902.



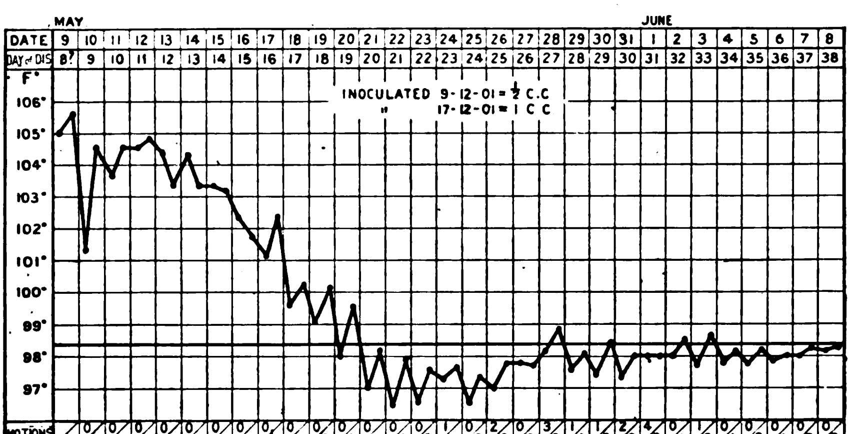
CLINICAL CHART—E.

Corps, 7th Hussars. *Hospital Station*, No. 16, Elandsfontein.
No. 4410. *Rank and Name*, Private W. Rhodes. *Age*, 22. *Service*, 4 years.
Disease, Enteric Fever. *Date of Admission*, April 14th, 1902.



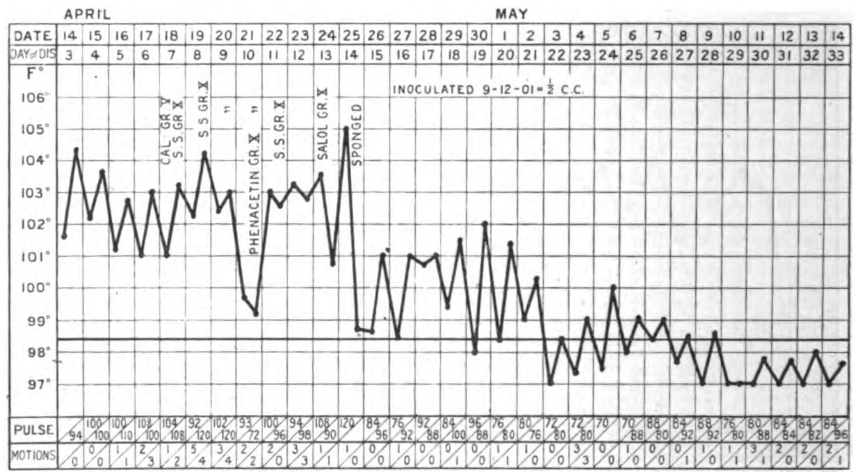
CLINICAL CHART—F.

Corps, 7th Hussars. *Hospital Station*, No. 3 General, Kroonstad. *No.* 5315.
Rank and Name, Private A. D'Arcy. *Age*, 22. *Service*, 2 years. *Disease*, Enteric Fever.
Date of Admission, May 9th, 1902. *Date of Discharge*, June 20th, 1902.
Result, Convalescent. Rejoined Regiment, June 30th, 1902.



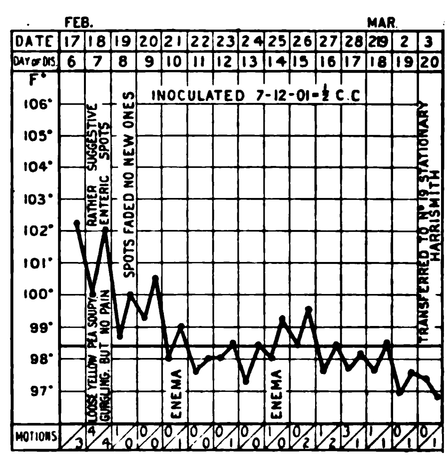
CLINICAL CHART—G.

Corps, 7th Hussars. *Hospital Station*, No. 11 Stationary, Winburg.
No. 5527. *Rank and Name*, Private Mulholland. *Age*, 21. *Disease*, Enteric Fever.
Date of Admission, April 14th, 1902.



CLINICAL CHART—H

Corps, 7th Hussars. *Hospital Station*, Bethlehem.
No. 5585. *Rank and Name*, Private G. Elliott. *Age*, 24. *Service*, 11 months.
Disease, Enteric Fever. *Date of Admission*, February 17, 1902.



Private Jones, twice inoculated, reported sick while on trek, and was treated for five days in the ambulance, trekking on an average twenty miles a day, before he could be got into a hospital, after which the temperature was of a very low range (Chart B). The Medical Officer in charge of the case states: "This case was an exceptionally mild one throughout. He was discharged hospital May 9th, and has been taken on here as a convalescent orderly till he is strong enough for regimental duty.

Private D'Arcy, twice inoculated, was, up to the day on which he reported sick, May 8th, engaged in the final "drive" of the war to the Lindley-Kroonstad Blockhouse line, and had been riding on an average thirty miles a day, while on the last day, May 7th, fifty miles were covered, but he did not report sick till the "drive" was over. It may fairly be claimed that these factors contributed to the high temperature after his admission to hospital, and it is also improbable, as is stated, that it was the eighth day of the disease. In any case, up to the date of his admission he had been performing most arduous duties. He was in hospital from May 9th, 1902, to June 20th, 1902, and rejoined the regiment for duty June 30th, 1902, looking extremely well and fit (Chart F).

Private Labrum, inoculated once, was reported to have been a mild case.

One may well claim that in this satisfactory result inoculation played a great part. As has been shown, for the period of six months which this report covers the regiment had been under every possible condition of active service. The filtration and boiling of water had not been systematically done, and this necessarily so under the conditions prevailing. The systematic employment of these two precautions in a mobile column, or in a campaign such as the last six months of this war, is quite impracticable, however much one may be in sympathy with them. No one but those who have experienced it can possibly realise the insuperable difficulties. At the beginning every effort was made to filter or boil the water, but it soon had to be abandoned. With regard to boiling the water for a mounted column or regiment, and under conditions of fighting such as we have lately had, I do not, from my experience, believe that any regimental system is possible. It is difficult to conceive any form of wheeled carriage which would meet the requirements of and supply "safe water" to a mobile column, moving so rapidly and covering ground where it would be impossible for a wheeled cart to accompany it; while in the "drives" a regiment often covered a front of two or three miles for three or four days, and at no time

would the men have been together or concentrated. If a water-cart had been, say with headquarters, it would have been impossible to supply water to those away on the flanks. The opinion one formed was, that all one can do is to impress on the individual the necessity of boiling his drinking water, and by drinking tea or coffee much in this way can be done, and is by some of the men, but many men will, in spite of everything, drink any and every water they come to. They take their chance often full well knowing what the result will probably be. Much may be done by training men to go for many hours without drinking, but the ordinary soldier, accustomed as he is to drink on every possible occasion, appears to be unable to resist the sight of water. This was particularly brought home to me by seeing on one occasion a man half an hour after we had left camp, where he had just finished a good meal and could get as much good water as he liked, stop at a filthy dirty wayside pool to drink. When ordering him to desist, I asked why he wanted it, and he replied that he did not know when he would get the next one. It is very questionable if such an offence can be made a punishable one, or how one can stop it.

It would have been interesting and instructive to compare the above results with those of the 2nd Dragoon Guards, a regiment which had been with the 7th Hussars during the last five months and under exactly similar conditions. This regiment, which was an uninoculated one, and had only landed in the country a few weeks before the 7th Hussars, had a strength of 357 N.C.O.'s and men, against 438 of the latter. Unfortunately, one is unable to obtain exact figures, as no record was kept, but it is known that they lost from enteric fever one officer and over twenty men, during this period.

On April 13th, 1902, a draft for the regiment (7th Hussars) of forty-eight men arrived at Cape Town. They were uninoculated. On June 20th there had been four cases of enteric fever with one death, or a percentage for the two months of 8·3.

It is interesting to follow on the history of this regiment after the period which the above report covers, viz., June, 1902, to the end of 1905, during which time it remained in South Africa, and most of the time was under canvas.

Number of cases of enteric between June 21st, 1902, and December, 1905 :—

Inoculated twice.	Date.	Inoculated once.	Date.	Uninoculated.	
1 ..	January 2nd, 1903	1 ..	January 31st, 1904	16	5 in 1902 7 ,, 1903 4 ,, 1904 0 ,, 1905

These figures are very remarkable when one remembers that originally there was a total of 286 inoculated, as against 238 uninoculated, and though it may be urged that there are many fallacies, they apply equally to the inoculated and uninoculated. The above results point to a longer period of protection than has generally been credited for inoculation, and this has been very strongly brought out by an examination of the blood of two groups of men who were inoculated, contrasted with a group of uninoculated, suggested by Lieutenant-Colonel Leishman. When at Norwich, I accordingly took three groups of blood: (*a*) of six men inoculated twice, and who had a severe reaction after inoculation; (*b*) of six men inoculated twice, followed by a slight reaction; (*c*) of six men uninoculated. These were taken on February 26th, 1906, and sent to Lieutenant-Colonel Leishman, and the report is appended to this paper. It will be seen how very much longer the protective substances have remained in the blood than has previously been recorded.

When I was lately asking some of the inoculated men the opinion they formed as to the benefit derived from undergoing the inoculation, they were nearly all strongly unanimous in its favour, and it was a curious thing that many of the men told me that while in South Africa they had experienced an almost complete immunity of the slight attacks of fever lasting three or four days, which are so common in South Africa and other tropical and subtropical countries, while, on the other hand, there were numerous cases in the uninoculated, and I am informed that the same thing has been observed in India, where the men have great faith in antienteric inoculation as a prophylactic for malaria and other fevers. Any one who has had practical experience of typhoid epidemics will remember that they are nearly always accompanied by a number of cases characterised by transient fever, or gastro-intestinal symptoms, which are probably really cases of typhoid, though not recognised as such, and possibly this is a solution of the above. It opens up a wide field of work for those who have the opportunity, and one hopes that everything possible will be done which will throw light on this most important subject.

Note by Captain W. S. Harrison, Royal Army Medical Corps.

Estimations of the bactericidal action and of the agglutinins present in the sera of one officer and of two separate groups of men were made in the same way as in the experiments described in the Journal of the Royal Army Medical Corps,

(July, 1905), with the modification that in the bactericidal estimations an experiment with normal sera was done simultaneously with the experiments on the sera of the inoculated men. The following were the results:—

No. 1.—Captain T. First inoculation ½ cubic centimetre, December 5th, 1901; second inoculation, 1 cubic centimetre, December 13th, 1901. Highest temperature after inoculation, 100·4° F. Blood serum taken February, 1906. Bactericidal action: 1—40 diluted serum killed the bacteria in an equal volume of a 1—10,000 diluted broth culture of *Bacillus typhosus*. The sera of a group of two normal men killed the bacteria in the same diluted culture in a dilution of 1—10, *i.e.*, the bactericidal action of the subject was four times greater than that of normal men. Agglutinins: there was a complete reaction in a dilution of 1—30.

No. 2.—The pooled sera of six men who had a severe reaction at the time of inoculation (November, 1901) gave a bactericidal action in a dilution of 1—60 (sera taken February 26th, 1906), as against 1—10 with the pooled sera of six normal men, and gave an incomplete reaction of agglutination in 1—30 dilution.

No. 3.—The pooled sera of six men who had a mild reaction at the time of inoculation (November, 1901), gave a bactericidal action in a dilution of 1—40 (sera taken February, 1906), as against 1—10 with the sera of six normal men, and it gave a reaction of agglutination in a dilution of 1—20.

In the above experiments on the two groups of men, the normal men with whom they were compared were selected as being of the same age and service, and as having been exposed throughout to the same conditions as the inoculated men.

Other favourable results have come to hand from the German troops in South-west Africa (*Archiv für Schiffs u. Tropen Hygiene*, December, 1905). The disease was observed in 424 cases, of which 100 had been previously inoculated and 324 had not. The following table shows the result:—

	Total number of cases of enteric	Inoculated once	Inoculated twice	Inoculated thrice	Total inoculated	Uninoculated
Number of cases	424	30	52	18	100	324
Died	..	3	1	..	4	36 (11·1 per cent.)
Severe cases ..	..	6	3	1	10 per cent.	25·3 per cent.
Average cases ..	..	..	..	..	20 ,,	21·3 ,,
Slight cases ..	..	..	..	..	66 ,,	42·3 ,,

There were complications in 113 uninoculated cases (34·9 per cent.) and in 20 inoculated cases (20 per cent.).

THE FIELD SERVICE FILTER WATER CART.

By Major T. Mc.CULLOCH,

Royal Army Medical Corps.

The actual preparation of sterilised water is, as a rule, a simple matter, and most of the numerous methods of sterilisation, whether by heat, or by filtration, or by chemical means, may be trusted to render a polluted water safe for drinking purposes. Careful attention to detail is essential, but the manipulations involved are not generally of a complex kind. Nevertheless, the provision of sterilised water on field service is far from being an easy problem. The great difficulty is to supply the purified water with regularity and in sufficient quantity, amid the bustle and constantly changing conditions which are inseparable from active service; and to make arrangements which will ensure that every soldier in the field can always *easily obtain* safe water, no matter what his surroundings may be, and so that, however great his thirst, he will not be tempted to drink the first water he comes across. The very difficult nature of the supply part of the problem can perhaps only be fully appreciated by those who have had field service experience. Such difficulties are not confined to our own army, but are the common experience of all armies. For instance, with reference to the French army, Vaillard points out in his paper* on "L'Epuration de l'Eau Potable en Campagne," that although boiling requires no special plant other than the camp kettle, yet there are many difficulties, such as the provision of fuel, the time taken to raise the water to boiling point, and the time taken for it to cool; meanwhile you must control the thirst of the soldier, and in the end offer him water often unpalatable. After fully discussing the question from all points of view, he arrives at the conclusion that for troops on the march boiling and filtration are not practicable measures, and under such conditions he pins his faith to chemical sterilisation by iodine (Vaillard and Georges' red, white and blue "Tabloids"). It has also been recently placed on record from a German source, that great difficulties have been experienced in the attempts made to provide safe water for the German troops engaged in the campaign against the Herreros in South-wes Africa. Several kinds of filters and heat sterilising apparatus have been in use. Some of the filters clogged, others did not sterilise.

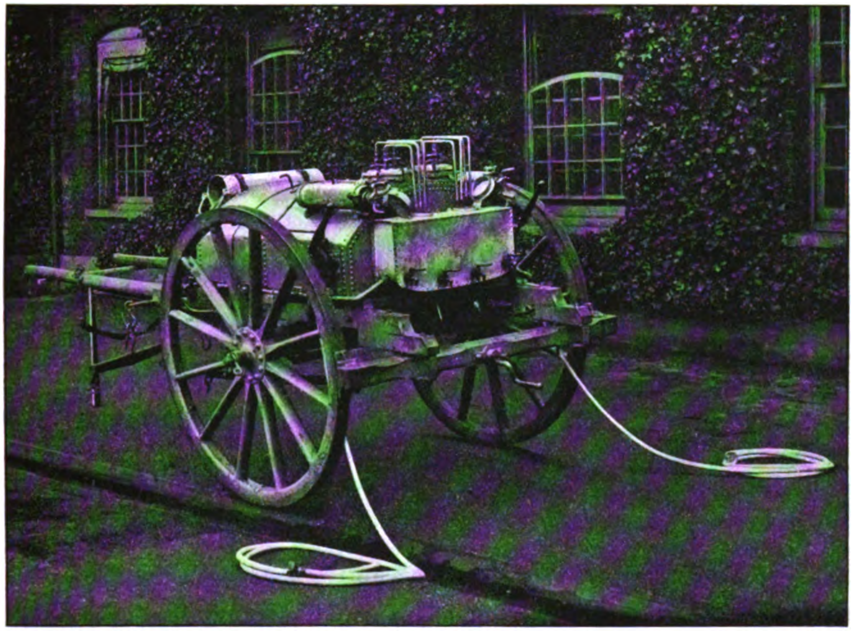
* *Archives de Médecine et de Pharmacie Militaires*, 40, 1902.

A large type of steriliser, mounted on wheels, was on trial, but the apparatus did not always work well and, in a country where draught animals were scarce, transport became a matter of great difficulty, and eventually these sterilisers had to be relegated to stationary camps and hospitals. Small sterilisers were also tried, but with similar results. In the end the soldier was instructed to do his own boiling, and he was advised to avoid water that had not been boiled. Dr. Schian, who gives this information, acknowledges that he himself had often drank unboiled water to appease his thirst, and he lays special stress on the great difficulty of compelling men, parched with thirst, to restrict themselves to the use of boiled water only.

Since the close of the South African War, the question of devising satisfactory means for providing sterilised water for the soldier on field service has received much attention in our own army. Different forms of apparatus have been tried, and every likely method of water sterilisation has received careful consideration, and the teaching of our experience is that the employment of more than one method will probably always be required to meet the variety of conditions obtaining on active service. Boiling and heat exchange apparatus can be effectively used in standing camps. While for use under circumstances where neither boiled nor filtered water are available, each soldier might carry a small box containing a supply of the red, white and blue "Tabloids," for Vaillard's iodine process, which is the most satisfactory of the present known methods of sterilising water by chemical means. The common source of supply, however, will be water sterilised by the field service filter water cart.

It is probably within the knowledge of many officers of the Corps that two demonstrations of the best known methods of sterilising water for field service purposes were given in London, at Millbank Barracks, in February and August, 1905. At these demonstrations the possibility of obtaining a satisfactory solution of the "safe" water supply difficulty, by the use of sterilising filters fitted to the ordinary service water cart, was clearly established. Since then, many improvements have been effected, and the outcome is the cart shown in the accompanying photograph. The trials of the cart have been so satisfactory, that the conversion of a large number of water carts to the "filter pattern" has been sanctioned. It is, therefore, important that the principal points connected with the sterilising fitments of the cart should be widely known, and it is with that object that the following description of the cart, and the instructions for its working, are given.

The cart is the latest pattern, iron, tank water cart, 108 gallons capacity, fitted with two pumps, two clarifying filters, and, for sterilising purposes, eight Brownlow filter candles. There is a small seven-gallon tank at the back of the cart which receives the sterilised water, and fitted to this and to tubes running along each side of the cart are twelve taps at which water bottles are filled. There is a wooden locker in front for carrying spare parts, and a kettle for sterilising the candles is strapped on the top of the locker. Two lengths of hose pipe, each having a rose fitted with wire gauze mesh at one end, and having a screw wing nut attachment at the other end, are carried coiled round hooks on the top of the tank.



WATER CART.

Clarifying Filters—The main tank of the cart carries water which has been freed from suspended matter by being passed through the clarifying filters. The clarifying filters consist of compressed sponge contained in the two horizontally placed cylinders shown on each side at the back of the cart. Compressed sponge has been found the best material for this purpose; it can easily be cleansed by boiling.

Sterilising Filters.—Water is sterilised as required. The eight Brownlow candles are in two sets of four, placed in separate chambers, which are fitted inside the tank. This has been found the safest position, and the cart has been subjected to very rough usage without damage to the filter candles. Each filter candle is covered with a special filter cloth which is found to lessen clogging. The clarified water in the main tank is pumped through the sterilising filters. Each candle has its own delivery tube, or "swan neck" as it is called, which gives, perhaps, an appearance of complication and fragility, but it is considered better to have eight separate tubes than to have them run together so as to deliver from one, as alteration of the delivery from any one of the candles would give immediate evidence of defect, and show which candle was defective; and for a similar reason the tubes are made to discharge in the open.

A store of sterilised water is not carried, except the water that may be in the seven-gallon tank behind. The reason for this is that the water can be sterilised as fast as it can be distributed. Indeed, as twelve water bottles can be filled at one time, the filling of the water bottles can be carried out much more expeditiously than was previously possible from the ordinary water cart, and the possibility of the sterilised water becoming contaminated during storage almost entirely disappears. The pumping is not laborious. Both tanks can be readily got at for special cleansing.

The output of sterilised water is far beyond anything that can be obtained by any other method, namely, after nine days' continuous use the yield of sterilised water was found to be 210 gallons per hour. Lastly, it has the advantage of not adding to army transport, as these carts are intended to replace the authorised water carts, two of which are now allotted to each battalion.

To ensure success, these carts will have to be placed in the charge of men who have been specially trained in the use and care of the filtering apparatus.

Some knowledge of the principles of water sterilisation should also be possessed by every soldier, as the success of this, as of any other scheme for providing sterilised water to troops in the field, depends largely on securing the intelligent and willing co-operation of both officers and men. It must be practicable to provide the soldier with sterilised water at all times, and in sufficient quantity, and there must be organised arrangements for its distribution, both on the march and in camp.

The instructions for the working of the Field Service filter water cart are as follows :—

(1) The pumps, which are placed on either side at the back part of the main tank, are quite independent of each other in their action, and can be worked either together or separately.

(2) Each pump serves one set of filters, namely, the clarifying and sterilising filter (4 candles) on its own side.

I.—To Fill the Main Tank.

(3) Fix the lengths of hose to the elbowed unions, which are situated one below each pump. The rose end of the hose should then be dropped into the pond or stream.

(4) Before beginning to pump, turn the cock placed between the horizontal clarifying filter and the vertical sterilising filter, so that the indicator mark points in the direction of the main tank. This shuts off the sterilising filter and opens the way for the passage of water through the clarifying filter into the main tank.

(5) The pump should be worked at about fifteen to twenty strokes per minute. The distance through which the handle of the pump can be moved is limited, and it should be worked easily and without jarring. It is a mistake to attempt to force matters by pumping too quickly. Both pumps can, of course, be worked at the same time.

(6) After filling the tank, remove the lengths of hose, and coil round the hooks on the top of the tank.

II.—To Pump the Clarified Water from the Main Tank through the Sterilising Filter.

(7) Turn the cock (see 4) so that the indicator mark points in the direction of the sterilising filter.

(8) If not already in position, fasten the bent delivery tubes (swan necks), by means of the wing nuts, to the eight ends of the metal tubes which come through and project above the cover of the filter cases containing the sterilising candles. The wing nuts should be screwed up so as to make a tight connection.

(9) The free ends of the swan necks should be brought together in two sets of four, so that each set of four delivers into one of the two circular openings on the top of the small sterilised water tank situated at the back of the cart. The lids for covering these openings should be kept tightly closed except when filtering is going on.

(10) The pumps are worked as for filling the main tank (see 5).

(11) If any tube is observed to be working defectively, the working of the sterilising filter should be stopped, the swan neck

of that particular candle removed and a plug screwed in, so as to throw that candle out of use until time can be obtained for its examination. The filtration can meanwhile be resumed with the remaining candles in use.

(12) There are twelve taps at which sterilised water may be drawn. The large tap underneath the small tank is intended for filling kettles, and through it the tank should occasionally be flushed out.

(13) After filtering is finished, remove the swan necks and store them in the wooden locker in front, placing one of the plugs provided for the purpose in each of the openings of the tubes from the candles.

III.—Cleansing and Sterilising the Cart and Filters.

(14) Flush out the large tank once a month, or once a fortnight if very muddy water is in use. The small tank should be flushed out with boiling water once a week. When a cart has been standing unused for a time, both tanks should be carefully cleaned out before the cart is taken into use.

(15) The filter candles should be removed every three days, and, without removing the filter cloth in which they are wrapped, they should be placed in cold water in the flat kettle, and the water raised to the boiling point.

(16) Every sixth day, the filter cloths will be removed for examination of the filter candles. If the inside of the filter cloth is dirty, it may be rinsed in boiling water, but it should never be scrubbed.

(17) If the candles are dirty, scrub the surface well with the brush supplied for the purpose, rinse in clean water, then replace cloths and boil.

(18) Once a week, remove the sponges from the clarifying filter and rinse in boiling water; boil them once a fortnight.

Clinical and other Notes.

REPORT ON AN OUTBREAK OF SUPPOSED ENTERIC FEVER AT BULFORD CAMP IN THE SPRING OF 1904.

By Major C. M. FLEURY.

Royal Army Medical Corps.

During the latter part of February and the early part of March this year an outbreak occurred which, in the first instance, was believed to be enteric fever. The disease was limited in extent, and attacked only those living in one particular part of the camp, and further than this it attacked only those who lived at or were associated with a certain mess. There were no fatal cases, and the outbreak terminated as soon as attention had been specially directed to the supposed area of infection.

Case 1.—To deal with the outbreak in its entirety one must go back to the middle of December, 1903, when a civilian waiter employed at the Mounted Infantry Mess, under Messrs. Dickenson, left his employment feeling unwell. Within a few days he was admitted to the local infirmary at Amesbury with what was diagnosed as enteric fever. The medical man in charge there stated that the symptoms clinically were undoubted, and the patient eventually recovered, after going through the various stages of the attack. The facts of this man's illness were duly reported, and every possible precaution taken at the time to prevent any further outbreak. No serum diagnosis was carried out in this man's case. So much for the previous history bearing on the case. We now come to the outbreak, such as it was.

Case 2.—On February 24th a scullery-man employed at the Mounted Infantry Officers' Mess sought medical aid, and left the camp sick on February 29th.

Case 3.—An officer of the Mounted Infantry, Lieutenant D., was placed on the sick list on February 26th, with symptoms which the local medical man, who treated the case, believed to be those of dysentery.

Case 4.—Another officer of the Mounted Infantry, Lieutenant T., was placed on the sick list on March 1st, with symptoms suspicious of enteric fever.

Case 5.—Next we come to the case of another waiter in the same Mess, Civilian F., who sickened with much the same symptoms, and was admitted to hospital on March 3rd.

Case 6.—The chef, employed at the same mess, left the camp sick on March 4th, and the symptoms eventually turned out to be those very closely resembling enteric fever.

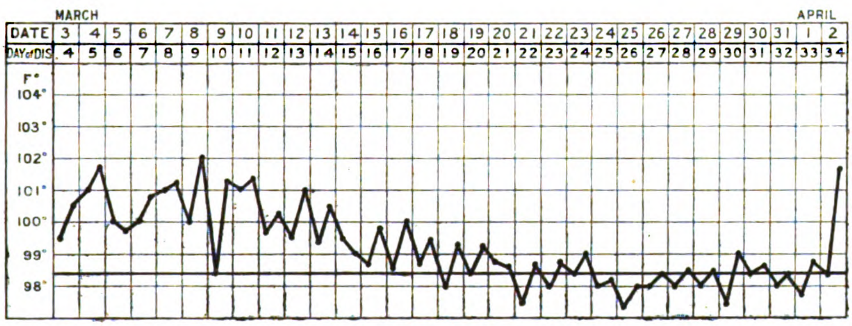
Case 7.—Lastly occurred the case of Major A., of the Notts and Derbys, who, although not living at the Mounted Infantry Mess, dined there from February 1st to February 4th, and again on February 10th. He became ill on March 6th, and was brought to hospital on March 9th with symptoms closely resembling those of enteric fever.

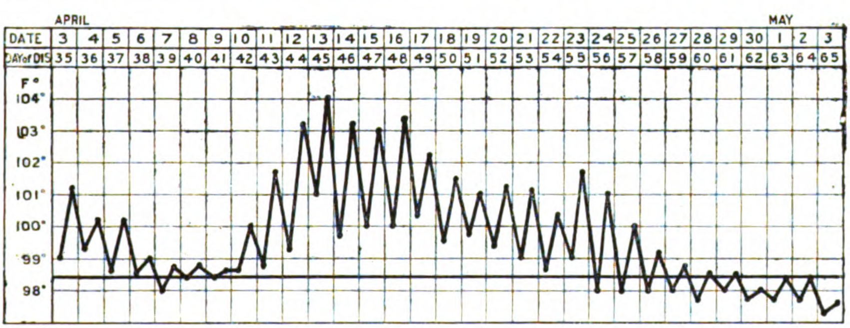
These cases comprised the whole of the outbreak. In enumerating the cases I have called the case which occurred in December, 1903, Case 1, though strictly speaking this should hardly be included among the others, comprising the outbreak proper. Case 1, as I have already said, made a complete recovery. Case 2 remained in some doubt, but from the history subsequently obtained he went through an attack very similar to the others. Case 3 went to his own home, and the local medical man wrote and said that the case was one of undoubted enteric fever. Case 6 left the camp and we were unable to obtain accurate information as to his illness. So far as we could ascertain he was laid up for a considerable period. This brings us to the three cases, viz., 4, 5 and 7, which were treated in the Station Hospital here.

Now, as regards Case 4, I am sorry to say that when this case reached the Station Hospital he was already convalescent. The temperature was normal, pulse 80, regular and strong, and beyond the fact that the patient looked very ill and had lost a good deal in weight, he had nothing very remarkable to show in the way of symptoms. The blood in this case was, however, sent to London for examination, and the report received was that it reacted to the typhoid bacillus 1 in 20, and faintly 1 in 30. That it also reacted somewhat feebly to a paratyphoid organism. A second supply of this patient's blood was sent to London, and on this occasion there was no reaction to either organism. When the second supply was sent the patient was practically convalescent, and even when the first was sent up the patient had commenced to recover, the temperature was normal, and the activity of the disease was very markedly lessening. I am afraid, therefore, that we got Case 4 too late in the disease to be sure of anything, but I think, assuming from the history given us, that the symptoms during the first three weeks of the illness were those of a mild attack of enteric fever, that the disease was due to either an organism of the enteric group, or the allied, if I may so put it, paratyphoid group. This patient rapidly regained his normal weight, and was soon as fit and well as he had been before the illness. This officer was aged 22; he had once been inoculated against enteric fever in August, 1900.

Next we come to consider Case 5. In this man's case I am able to attach a complete chart. In the first place, he was a comparatively old man, being 49 years of age. He stated that he never left the camp, and being a waiter he partook of all his meals in the mess kitchen. He also slept there. As will be seen from the chart, this patient went through two complete attacks, or perhaps we should say one attack

and a relapse. His blood reacted to the typhoid bacillus well, and failed to react to the paratyphoid at all in the early stages. Afterwards, when a second supply of blood was sent to London, he reacted very feebly indeed to the enteric organism, but did so in a marked manner to the paratyphoid. Clinically, this patient presented symptoms which were more typical of an enteric case than any of the others, but as in the other cases, none of the symptoms were at all severe. Thus, he had no hæmorrhage from the bowel. The bowels were as in all these cases somewhat confined, and in no single instance, so far as I am aware, was the enteric stool, as it is understood, present. In no single case were there spots on the abdomen, but each of the three cases which were in the Station Hospital had a furred tongue, headache and a general malaise.





Case 5 was progressing most favourably when the relapse supervened, and one was quite unable to account for it. This patient took by far the longest time to recover, but it should be borne in mind that he was a much older man than any of the others, and a very much less healthy subject than the other two cases we had in hospital. This patient was in hospital eighty days, and eventually left convalescent. At no time was there any albumen in the urine.

In all three cases which came into hospital the abdomen was somewhat tumid, but there was no pain or gurgling in the iliac fossa, and there was no evidence of any enlargement of the spleen.

The diagnosis in Case 5 must be very doubtful. Only once did it react to the typhoid organism, and afterwards when the symptoms pointed to well-marked enteric, it is true of a mild type, yet the blood then failed entirely to react to typhoid, but did so to an organism of the paratyphoid group. This man had never been inoculated against enteric fever.

Now we come to the last case, viz., Case 7, and in some ways much the most interesting one. This officer was aged 36, and had been for nearly three years in South Africa during the war, and had not contracted enteric fever out there. Another point of interest is this. It is the only case of the series where the patient did not live at the Mounted Infantry Mess, but he did live there for four days at the beginning of February, and for the last time he dined there as a guest on February 10th. This officer began to feel ill about March 5th, or three weeks after his last meal in this mess. He rapidly became ill, with headache, furred tongue, high temperature and a general feeling of malaise, and was admitted to hospital on March 9th. On admission, he presented the symptoms of enteric fever of a mild type; the bowels, as in the other cases, being obstinately confined. This officer had never been inoculated against enteric fever. The blood was, in this as in the other cases, sent to London, and a negative result was the report. Perhaps a more accurate diagnosis might have been obtained had I sent more blood, but I was unable to obtain a satisfactory amount for various reasons. When everything appeared to be progressing well the temperature started to rise again, and eventually the patient went through another complete attack. During this attack I was able to obtain a fair amount of blood, and this time the report was that it reacted to 1 in 20 and feebly to 1 in 30 with a typhoid organism, but that it also reacted very strongly to an organism of the paratyphoid group. A further examination of the blood was made, and this time it failed to react to typhoid, but did so markedly to the paratyphoid group. This patient was greatly troubled with night-sweats of the most severe character, the sweating being sufficiently profuse to wet through the entire bedding. He wasted to an extraordinary degree; in fact, far more so than any of the other cases. A curious point is this, that in both his attacks, so far as one was able to calculate, the temperature reached normal on the twenty-first day or thereabouts, but clinically the symptoms were not those of a well-marked enteric case. A fairly rapid recovery ensued, but for a few days there was a suspicion of thrombosis in the left leg. This, however, came to nothing, and the temperature never rose above normal again; severe cramps, with some tenderness in the legs, being the only unpleasant symptoms. The tongue in this case was covered with a thick fur until convalescence was reached, and the bowels were always obstinately constipated. In fact, constipation was the chief difficulty in the case. This concluded the epidemic, and the following were, to my mind, the chief points of interest.

(1) The extremely local character of the epidemic.

(2) The fact that all the cases were fed from the same mess, and even in Case 7 the patient fed there as late as February 10th.

(3) None of the N.C.O.'s or men of the Mounted Infantry were affected.

(4) There were no cases of enteric in the camp except Case 1, which occurred as long ago as December, 1903, and then in the same mess-kitchen.

(5) All cases reacted to the paratyphoid group in a more marked manner than the typhoid group.

(6) They all rapidly reached convalescence, and in no single instance was there any complication or hæmorrhage from the bowel.

The treatment of all was very similar. Rest, careful dieting, quinine tonics, and, in the later stages, mild aperients and enemata. Case 7 derived marked benefit from small doses of calomel, but the good effect of this drug was not so obvious in the other cases.

The point which naturally arose to one's mind was, were these cases all cases of enteric fever, or were the symptoms seen all dependent on infection by an organism of the paratyphoid group? Clinically, I suppose one would be inclined to say they were very mild enteric cases, but bacteriologically the evidence was all in favour of their being due to infection by an organism of the paratyphoid group. If the latter, from whence came the infection? That will, unfortunately, never be answered. Every possible sanitary precaution was taken, but the source of infection remains untraced. Subsequent investigation revealed the fact that the sanitary precautions taken in the officer's mess kitchen might have been fuller. Anyway, as soon as things were thoroughly taken in hand there the epidemic ceased.

These few cases which I have recorded here are interesting, I think, in showing that we must be prepared to meet with cases, which, although not reacting to Widal's reaction, yet present symptoms very similar to those of enteric fever, and until further light is thrown by bacteriology on these cases, I presume one must conclude that they are due to infection by a paratyphoid organism.

TRAUMATIC RUPTURE OF MIDDLE MENINGEAL ARTERY; OPERATION; RECOVERY.

By Captain L. W. HARRISON.

Royal Army Medical Corps.

On August 19th, 1904, I received a message at 10.30 p.m., to the effect that a native, Mircin Bux, had been brought to the Followers' Hospital, suffering from a blow on the head, inflicted by another native, and that he was seriously ill. On arrival I ascertained that in a quarrel another

native had struck the patient on the side of the head with a heavy stick (*lathi*), knocking him down; that patient had got up again, though feeling rather dazed, and had walked to hospital, arriving there at 8 p.m., two hours after receipt of the injury; that he had sat on the bed discussing the affair with his neighbours till about 9.30 p.m., when he rather suddenly became unconscious.

On examination, patient was comatose, though occasionally putting his left hand to his head; the breathing was low and stertorous, and the pulse slow and full. The pupils were unequal, the left being dilated, and there was complete right-sided hemiplegia. There was a swelling under the left eye and of the temporal fossa on the left side. The history of his having walked to hospital, and the physical signs, afforded a clear clue to the kind of injury he had sustained, and after giving instructions to shave and clean his head, I went off to the Station Hospital to procure instruments with which to tie his middle meningeal artery. At midnight I turned down a semicircular flap, exposing an area of skull having its centre one and a half inches behind the external angular process of the frontal bone and one and a half inches above the zygoma. A linear fracture was found crossing the anterior inferior angle of the parietal bone and through this blood was very slowly oozing. With a one-inch trephine I removed a disc of bone and immediately a clot of blood bulged into the trephine hole which it filled. The clot removed, a spouting point was exposed at the lower end of the trephine hole. The latter was accordingly extended towards the zygoma and the bleeding anterior branch of the middle meningeal artery was discovered on the dura mater. Considerable difficulty was experienced in picking up the artery, as a fully curved needle could not be obtained. It was eventually tied by scratching through the dura mater on either side of the artery, picking up the intervening dura and artery with dissecting forceps and passing a ligature round the whole. To remove clot, bone had to be removed down to the level of the zygoma, and there it seemed to have extended to the base of the skull. Above, a disc of bone was removed from the area between the parietal eminence and the margin of the original trephine hole. Here more clot was exposed and removed. The flaps which had been taken down to expose the bone were then stitched up and a drainage tube left in.

The operation took a considerable time owing to the difficulty of tying the artery, and the fact that neither Hay's saw nor chisel being available, the whole of the bone-cutting had to be done with a one-inch trephine. Patient's breathing improved considerably during the operation and his general condition seemed to be much better when the operation was completed. During the whole of the 20th he seemed only partly conscious, but on the 21st made a rational statement to the magistrate and recognised his assailant. On the 22nd he was caught playing cards with his fellow-patients, and his after-history, as regards his mental condition, was uneventful. The wound, however, gave some trouble, two

sinuses persisting for a long time. Every precaution possible was taken to ensure asepticity, instruments and dressings being boiled previously to the operation, and every dressing, and these were only removed from the pan by myself. A bed in an Indian Followers' Hospital is not, however, an ideal operating table, nor are the surroundings all that one could desire.

Patient left hospital on October 27th, 1904, quite well.

ARTIFICIAL DENTURES.

By Major R. C. LEWIS.
Royal Army Medical Corps.

Towards the end, and after the late Boer War, so many men were invalided for defective teeth, that the subject was prominently brought to the notice of the authorities, and as a means to obviate the wastage from this cause, the supply of artificial dentures to N.C.O.'s and men was sanctioned in the case of those who otherwise, by their dental deficiencies, would be inefficient, and have to be invalided.

After a comparatively short time, the expense of supplying dentures became so enormous, that restrictions have been brought into force, from time to time, which have cut down the number of those cases, entitled to be provided at the public expense, very considerably.

So many complaints of badly fitting and broken dentures having been brought to my notice during some seven months I was in medical charge of about 800 men in India, that I was led to make a careful inspection of all those men of the unit who had been provided with dentures within the past three years, 50 cases in all; out of the total number I found that only 22 were satisfactory, that is, worn continuously, and used for the purpose of mastication; and in three of these cases a tooth was broken. Of the remaining twenty-eight men their dentures were broken, or not used for mastication in consequence of the plates not having been worn continuously, the secondary changes in the gums and teeth causing their use to become painful. This, I take it, is about the average throughout the army; most of the men kept their false teeth either in their pocket or kit box.

From the foregoing it is obvious that about 50 per cent. of these men would be unfit to proceed on active service at short notice, and if during peace time the results are so unsatisfactory, how much more so would they be during the stress of active service, when the chances of their being lost, and broken, would be increased a hundred-fold.

Many men come up for teeth really for æsthetic reasons.

The obvious induction is, artificial dentures are of little practical value in 50 per cent. of those cases supplied, unless the men are made to wear them daily, and that all men so fitted should be inspected at

regular intervals by a competent dentist, who would see that the plates fitted properly, and were efficient. The teeth of every recruit should be inspected by a dentist soon after his enlistment, and the necessary fillings, &c., carried out. Until dentistry is put on a proper basis in the army the wastage of men and loss to the State will still run into very large figures.

A practical suggestion was put forward some time ago in a letter to the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, as to the advisability of training a certain number of assistant surgeons as dentists, which would meet the case as far as India is concerned. This would be cheaper in the long run, and would, by timely repairs, prevent the large supplies of artificial dentures now required.

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A CASE OF LIVER ABSCESS.

BY CAPTAIN S. M. ADYE-CURRAN, R.A.M.C., AND DR. ALEX. KING.

LIVER abscess is comparatively rare in the West India Islands, therefore the following case is of interest. The patient, a Jamaica negro, aged 25, a private in the 1st West India Regiment, was admitted to the St. Lucia Military Hospital on October 16th, 1905, complaining of pain over the region of the liver, headache, nausea, and loss of appetite. He had just come off furlough, and stated that he had been drinking a considerable quantity of gin. His weight on admission was 126 lbs.

The previous history is unimportant. He stated definitely that he had never had anything resembling dysentery, and he had apparently never had syphilis. On admission his temperature was 102° F., and pulse 80; his tongue foul; stools clay coloured and pasty; urine reddish-brown and scanty, giving Gmelin's reaction for bile and a small trace of albumen; sclerotics deeply pigmented. His blood was examined for malarial parasites with a negative result. The result of physical examination was as follows: The edge of the liver extended just to the edge of the costal arch below; it was very slightly enlarged in the upward direction in the nipple line and slightly more so behind. There was considerable tenderness on percussion.

He was kept under observation and treated with ammonium chloride and occasional doses of calomel. While undergoing this treatment the bile disappeared from the urine, reappeared in the stools, and the pigmentation left the sclerotics. The temperature and general health, however, underwent no change for the better. The evening temperature reached from 102° to 103° F., dropping in the morning to 100° F., and even as low as 99° F., the chart as a whole resembling that of enteric fever. The pain was constant and night-sweats were frequent.

On the thirteenth day (October 28th) a large swelling was seen in the epigastrium, which the patient declared had appeared suddenly. On the

30th his condition was as follows: Tongue red at the sides and tip, thickly coated on the dorsum with brown fur; the sclerotics clear. The epigastrium was occupied by a hard, tender, dome-shaped mass, dull to percussion. The stomach was displaced downwards and to the left; the cardiac dulness was increased to the right but not upwards, the heart sounds being normal. There was a slight impulse felt all over the tumour synchronous with the heart beats, but not expansile. There was no fluctuation. The liver dulness corresponded below and on the right with the costal margin and was continued into the tumour. It was increased about one inch upwards in the nipple line, running into the enlarged heart dulness. From the nipple line backwards it rose in an even line to within one inch of the angle of the right scapula and from thence straight to the vertebræ. The base of the lung was congested behind. It was noticed that the radial pulses were unequal.

An aspirating needle was introduced into the pleural cavity about two inches below the scapular angle with no result. It was then pushed about three inches further in, but only a little blood came away. It was decided to operate in the morning. Dr. Branch gave chloroform. In the first place a large-bore needle was introduced at two other points on the right side again with no result. An incision was then made for three inches over the swelling in a line with the inner edge of the right rectus abdominalis muscle, which was pulled aside and the sheath behind incised. Pus immediately escaped. When the forefinger was introduced into the cavity it was felt to pass through a septum into another larger abscess cavity which extended upwards and backwards, and through the upper wall of which (just within reach of the forefinger) the apex beat could be very distinctly felt, giving the impression that very little tissue intervened between the finger and the ventricle. The pus was yellow, resembling the contents of the ordinary pyogenic abscess, and altogether thirty-five ounces were evacuated. The cavity was gently syringed out with 1 in 80 carbolic acid lotion, a large drainage tube inserted, and the wound dressed with sterile gauze and salicylic wool. Siphon action was not attempted. The pus was stained and examined with a half-inch oil immersion. No micro-organisms of any kind were found and no amœbæ; but there were large numbers of what were apparently necrotic liver cells.

The progress of the case was uneventful. The temperature varied at first round about 99° F., and there was immediate improvement in the general health. The discharge of pus, at first free, gradually lessened till, on November 10th, it was deemed advisable to replace the tube by gauze packing. Pus examined on this date gave a similar result to that of October 30th. At the present time (November 19th) the temperature is normal and the patient convalescent, his weight being 132 lbs.

The position of the abscess, the character of the pus, and the absence of micro-organisms and amœbæ lead us to the conclusion that this is

a case of what Cantlie has called suprahepatic abscess, *i.e.*, an abscess occurring between the folds of the peritoneum, where it is reflected off the upper surface of the liver on to the lower surface of the diaphragm.

THE ROYAL ARMY MEDICAL CORPS MILITIA AS A PRACTICAL SANITARY CORPS FOR THE ARMY.

By Captain K. STEELE.
Royal Army Medical Corps (M.).

All authorities appear impressed with the fact that though much has been done to improve the Army Medical Service of late years, it still lacks two essentials, indispensable to a great campaign, namely, a proper sanitary service and an effective reserve of nursing orderlies. It is imperative that an Army Sanitary Corps should be organised and that the duties of such a Corps, at present delegated to various authorities, should in future be consolidated in one department.

At the present time the Royal Army Medical Corps is responsible for reports and suggestions, the Royal Engineers for the construction of latrines, the Army Service Corps for the supply and distribution of disinfectants, and regimental officers for the control and protection of water supplies. No branch of the Service appears responsible for the disposal of the waste of the army, the scavenging of the army, and, as a consequence, we saw the deplorable condition of Bloemfontein in the early spring of 1900, of which it is not too much to say that, if there had been a proper Sanitary Corps at work, at least two main sources of trouble—sources which have never been fully discussed—would have disappeared; the one, the single overcrowded cemetery in the middle of the town, the other, the filthy condition of the supply camps. At the present time the medical officer, however much energy and foresight he may possess, can do little but write memos. and issue reports. He has no power to get work done, no men to dig, no men to burn, no N.C.O.'s trained to sanitary duties, no staff at his disposal. The occupation of Bloemfontein is not an exceptional case. As sure as war exists, so there will be bases, and standing camps, and winter quarters, and as sure as these exist there must be in the future a Sanitary Corps for the British Army. To every division, then, in the field should be attached a sanitary establishment consisting of a Royal Army Medical Corps Officer as Medical Officer of Health, a certain number of N.C.O.'s, who should be qualified Sanitary Inspectors, and 100 men. So that not only should the present divided control in sanitary matters cease, but all incidents and accidents affecting the health of the troops should be promptly and methodically dealt with. If we admit the necessity for a Sanitary Corps in time of war it would appear that the system on which such an establishment might

be most naturally and economically carried out would be one on existing Militia lines; for though the N.C.O.'s, the sanitary inspectors, should be trained and practised in their duties all the year round, it is hardly necessary to retain year in, year out, at any strength, companies of diggers, burners, and whitewashers. My suggestion is that the duties of such a corps should be assigned to that branch of the Royal Army Medical Corps known as the Royal Army Medical Corps Militia. At the present moment the Royal Army Medical Corps Militia is supposed to furnish a reserve of nursing and general duty orderlies to the Royal Army Medical Corps. In actual practice it does supply, most inadequately, both, but in very small and vanishing numbers, and with a training which is wholly insufficient. The Royal Army Medical Corps Militia man trains in hospital ten to twenty days in each year. He rarely comes out for training two years in succession, and nearly all the companies train below half strength, as the inducements to remain in the Militia are insufficient to retain men more than one or two trainings; each company requires from 50 to 75 per cent. of recruits annually, and the *personnel* is always changing, so that there can be no systematic and progressive method of training. Not only is there continual waste in material, but the present system of preliminary drill at Aldershot and annual training in a big military hospital is very expensive. All recruits, whether from Scotland, Ireland, or England, have to go to Aldershot for their preliminary drill, and their travelling expenses must come to a considerable item, which is really wasted money, since so few remain even one training in the Corps: 1,080 men joined the Corps in the past two years and 1,020 left. The Edinburgh Company sent to Aldershot in these years some 200 recruits, yet last year could train only between forty and fifty strong. It would seem then that hospital work does not appeal to these men, but open air work, spade work, and plenty of it, in the country, does. And I suggest that these Militia Companies be trained as for special sanitary duties in time of war, in the disposal of offal and carcases, the rapid erection of field latrines, the digging of drains and field kitchens, the boiling of water, and the lime-washing of sheds, and sanitation of temporary buildings. Small companies such as we have at present would be economical, since labourers could be recruited to any extent in wartime, and would be at once ready for work with a nucleus of trained labour to direct them. Employed as it is at present, the small companies of the Royal Army Medical Corps Militia are a source of danger, since to bring them up to strength in time of war, recruits must be obtained rapidly and trained hurriedly, a very inadvisable proceeding so far as a Medical Corps is concerned. By making this Militia the nucleus of the Army Sanitary Corps, great advantages would be attained, and many present disadvantages done away with. So long as the Royal Army Medical Corps Militia trains annually at half strength and changes its *personnel* every year to the extent of 75 per cent., the men must be useless for hospital nurses or

even as hospital servants. Let us look elsewhere, to the volunteers and St. John's Ambulance brigades, for this class of soldier, one who is practically in collar all the year round and is prepared for indoor work. Let us have not one depôt, but three depôts for this new Sanitary Corps, one in Scotland, one in Ireland, and one in England, at Aldershot. The expenses of the Royal Army Medical Corps Militia would thereby be much reduced. In the non-training period the N.C.O.'s of the permanent staff should be expected to qualify as Sanitary Inspectors. Some means might be found whereby an army examination, on similar lines to the present compounders' examination, might be substituted for a civil certificate. We should, then, have a Corps of Sanitary Pioneers, ready to hand, at the absolute disposal of the Royal Army Medical Corps Health Officer, ready to deal properly with all the coarser foci of disease; this Corps would be the greatest practical factor in the prevention of "avoidable diseases" the army has yet known.

Foreign Services.

THE ORGANISATION AND RESOURCES OF THE RED CROSS SOCIETY OF JAPAN.[1]

By Lieutenant-Colonel W. G. MACPHERSON, C.M.G.
Royal Army Medical Corps.

An official report on the Red Cross Society of Japan was submitted by the late Director-General of the Army Medical Service, Sir William Taylor, after the war between China and Japan in 1894-1895. In 1900 Professor Ariga, one of the leading members of the Central Committee, presented to the Paris Exhibition on behalf of the Society, a volume of 150 pages in 16 chapters with plans of hospital ships and a map showing the distribution of the Society in Japan. Professor Ariga has also prepared a similar but shorter *résumé* of the position of the Society for submission to the St. Louis Exhibition. This has not yet been printed, but through the courtesy of its author I have been permitted to read the original draft.

The development of the Society has made great strides since Sir William Taylor's report, and in a way, too, since Professor Ariga's report of 1900.

Under these circumstances I have ventured to put together the following notes. They are of interest to the Army Medical Service, because they indicate a logical and valuable method of providing for the expansion of the Medical Services in war, by utilising a *personnel* trained in time of peace by voluntary efforts, aroused by patriotic sentiment, such as our Army Medical Service has been accustomed to experience only when war has actually occurred; in other words, when it is an embarrassment instead of a help.

Brief History of the Society.—The Society had its origin in 1877, during the civil war of Kagoshima, under the name of "Hakuai-sha," or "Society of Benevolence." When the Japanese Government became a signatory to the Geneva Convention in 1886, the name was changed to its present title, "Dai Nihon no Seki-ju-ji Sha," or the "Red Cross Society of Japan." In 1894-1895 it assisted during the war with China, and in 1900-1901 during the Boxer troubles. In 1898 it became an Incorporated Society with civil rights, and from that date commenced to enter into contracts in order to guarantee a *personnel* for the various establishments which the Society undertakes to provide in time of war

[1] (This report was submitted in June, 1904, and is now published by permission of the Director of Military Operations.)

or of public calamity. These contracts were published in 1898, and have been revised in the Articles of Association of the Society in December, 1903.

An Imperial Ordinance was passed in December, 1901, authorising the Society to assist the Army Medical and Naval Medical Services in time of war, and laying down certain rules regarding discipline and control, relative rank of the *personnel*, &c.

The Society began as an influential Committee without local branches, and at a time when there were no other benevolent societies formed for aiding sick and wounded in war. The local development of the Society was the work of the Central Committee. The result of this is that the Society is a highly centralised body. The Japanese authorities, however, consider this to be one of the essential features in its utility, because by means of centralised control independent local associations and rival societies do not, and are not, permitted to exist. There is, however, one affiliated Association, "The Ladies' Volunteer Nursing Association," which was formed in Tokio in 1887. It is now called the Ladies' Committee of the Red Cross Society, and no one may belong to it who has not first become a member of the Red Cross Society.

Resources.—According to Professor Ariga's account the Society has at present over 900,000 members, equal to 1 in every 45 of population. The income during 1903 was 2,965,300 yen, or over £300,000 sterling. In addition to this annual income, which is obtained from member's subscriptions, donations, legacies, &c., the Society possesses a capital sum of 7,371,500 yen (approximately £767,000 sterling), exclusive of buildings and other immovable property.

Membership.—There are three classes of members: (*a*) Honorary; (*b*) Special; (*c*) Regular. The first class is practically confined to the Imperial Family and consists of 30 members only; the second class contains over 5,000 members, and is formed of those who have been specially selected by the Standing Council for admission without subscription, or who have made a donation of not less than 200 yen. The regular members form the bulk of the Society. They pay an annual subscription of 3 to 12 yen (6s. to 24s.) for a period of ten years, or a single subscription of 25 yen (50s.). Insignia of membership in the form of a silver medal, worn on the left breast, is granted by the Emperor, and is authorised to be worn along with other State decorations, at public gatherings.

The members of the Ladies' Committee number 538. They belong to the upper classes of society, and pay a monthly subscription of 20 sen, or 5d., for ten years, or a single donation of 20 yen (40s.)

In addition to membership there is what may be called the *personnel* of the Society. These form the various groups or detachments, trained by the Society for work in war and public calamities, or held in reserve for that purpose, and paid by the Society for their services. The details of this *personnel* are given further on.

Organisation and Management.—A general meeting is held annually in Tokio, for the election of a Standing Council of thirty members. The members elected serve on the Council for three years, but are practically always re-elected, so that the Standing Council may be called a Permanent Committee. The Council has a President, Count Matsukata, and two Vice-Presidents, and it elects eight Administrators, including the President and Vice-Presidents, to watch over the finances of the Society. The General Meeting also elects three Independent Comptrollers to act with the Administrators.

In the 47 prefectures, in the Island of Hokkaido and in Formosa, there are local branches, and in the cities and sub-divisions there are local committees, whose chief function is to enlist members and collect subscriptions. The latter must be paid in to the Central Treasury in Tokio, which pays only a proportion back to the local branches, namely, 40 per cent. to the fourteen prefectures where there are headquarters of the Army or Navy; 54 per cent. to Formosa and Hokkaido, and 35 per cent. to the other prefectures. The balance is administered by the Standing Council. The Presidency of the local branches and committees is held by the Prefectural Governors and Mayors of cities, &c., and the members of the local committees are officials of the Society and influential citizens who are members of the Society. The system of appointing the local heads of the Government to be the Presidents of the local branches is said to have contributed greatly to the prosperity of the Society.

Organisation for War.—The organisation for war has been carried out on lines laid down by the Medical Departments of the Army and Navy.

The chief organisation consists of what are described as "*Relief Detachments.*" These are composed of the following *personnel:* 2 Physicians, 1 Apothecary, 1 Clerk, 2 Chief Nursing Sisters or male nurses, 20 Nursing Sisters or male nurses; total 28. Each Relief Detachment is organised to take charge of 100 patients. Their function in war is to replace the sick attendants in the Military Hospitals of the home territory as these are pushed forward into the area of operations.

At present the Society has organised 112 "Relief Detachments" for work in Army Hospitals, and 4 for work in Naval Hospitals. Eighteen of the former are organised with male instead of female nurses, *i.e.*, 2 chief male attendants and 20 male nurses. Although the "Relief Detachments" relieve the Army Medical establishments gradually in the home territory, they may be moved on to relieve similar establishments in hospitals on the lines of communication as the war progresses. The peace distribution of these "Relief Detachments" is appended. Their distribution in war is under the control of the Standing Council acting under the orders of the military and naval authorities. For the exercise of proper control in this respect a General Administrator of the

Red Cross Society is appointed to the Imperial Headquarters, *i.e.*, in Tokio. No representative of the Society has been sent into the field.

The next organisation, at present in its infancy, is that of "*Transport Columns.*" These have been organised since the Boxer troubles, and have the following composition: 1 Manager, 1 Surgeon, 1 Clerk, 9 chief male attendants, 3 male nurses, 3 chief stretcher-bearers, 120 stretcher-bearers; total 138. Only three such columns have up till now been organised, but, it is stated, if the experiment proves them to be efficient during the present war, their number can be increased in a few months. The function of the "Transport Columns" is to undertake the transport of serious cases in places where there are no proper roads for transport by wheeled carriage, or other methods. The need of such columns was felt during the operations in China. Each column is organised to carry thirty serious cases, and afford at the same time medical attendance and nursing.

The next organisation is for service on the Society's Hospital Ships. At present the Society has two Hospital Ships, fitted for the conveyance of 200 sick and wounded, but it is intended to construct two more, fitted for 100 patients. The establishments are as follows: *Hospital Ship for* 200: 1 Manager, 4 Surgeons, 1 Apothecary, 2 Clerks, 2 Assistant Apothecaries, 2 Chief Nurses (female), 2 Chief Nurses (male), 20 female nurses, 20 male nurses; total 54. *Hospital Ship for* 100: 1 Manager, 3 Surgeons, 1 Apothecary, 1 Clerk, 1 Assistant Apothecary, 1 Chief Nurse (female), 1 Chief Nurse (male), 10 female nurses, 10 male nurses; total 29. The Hospital Ships at present in use, equipped and manned as regards medical *personnel* by the Society, are the "Hakuai Maru" and the "Kosai Maru." Both vessels belong to the Nippon Yusen Kaisha. They were built for the Society under the following agreement with the Company.

(1) The Society shall build and equip at its expense two ships for the transport of the sick and wounded.

(2) The plan of construction shall be determined by a technical committee composed of the Directors of the Medical Services of the Army and Navy, a naval architect belonging to the Imperial Navy, an engineer of the Nippon Yusen Kaisha, and members of the Administrative Committee of the Society.

(3) The actual construction of the vessels in accordance with the plan fixed by the technical committee shall be confided to the Nippon Yusen Kaisha.

(4) The ships so constructed shall be sold by the Society to the Nippon Yusen Kaisha at the cost of construction in partial payments of equal amounts without interest extending over twenty years, on the condition that whenever the Society shall have need of them for relief service, the Nippon Yusen Kaisha shall place one or both of them at its disposal without delay.

(5) The Nippon Yusen Kaisha shall have the liberty of transforming and repairing the ships while it is using them, but the moment they are called for by the Society they are to be restored to their original form and colour. For this transformation the Company shall be allowed a delay of thirty days in ordinary times, but only seven days in time of war.

(6) During the time the ships are being used by the Society in relief service, manœuvres, &c., it shall pay to the Company a charter rate of so much per ton, to be fixed according to the rate paid by the Government to the Company in chartering its ships.

(7) The cost of food, &c., for the relief staff shall be paid by the Society, while the ordinary running expenses, including the cost of coal, shall be paid by the Company during the time the ships are being used by the Society.

(8) During the twenty years, the Company shall take upon itself all responsibilities regarding damage or loss of the ships, subjecting them to repairs or replacing them with new ones built in exactly the same form.

(9) At the end of twenty years the Society undertake to build three ships with the accumulated sum of the partial payments from the Company and the compound interest paid upon them by the bank of deposit.

The contract was signed, after approval of the military authorities, on August 17th, 1897. The ships were built on the Clyde at a cost of £54,000 each. The details of tonnage, accommodation, &c., are appended.

The only other organisations of the Society are Rest Stations and a Supply Depôt. The former are organised by the local sections or branches, who supply such medical or other *personnel* as may be necessary. These Rest Stations are formed along the line of railway between the seaports and the military hospitals in the home territory. Their object is to offer rest and refreshment and, if need be, medical assistance to invalids on their transfer by rail from the port of disembarkation to a hospital in the interior. The system of transfer is, so far as I can gather, very similar to that adopted by us in England for invalids arriving from South Africa during the last war. A certain number of the military hospitals are assigned for the reception of sick and wounded from the front, and, following the German terminology, are called reserve hospitals. It is during the transfer of sick and wounded to these that the Red Cross Society helps by the formation of Rest Stations along the line of route. It carries out, though not to such an elaborate extent, the function assigned to the "Société de Secours aux Blessés" in France.

The Supply Depôt has not apparently been fully developed as yet. The object of the Depôt system is to receive and forward articles contributed in aid of the work of the "Relief Detachments," and it is intended to form such Depôts along the lines of communication. As yet, no Relief Detachments of the Society have proceeded to work in the hospitals on

the lines of communication, so that practically no Supply Depôts exist at present so far as I can gather. The *personnel* of a Supply Depôt will consist of one manager, one apothecary and two clerks. In time of peace only one Depôt is kept ready.

Mobilisation Arrangements.—The plan of mobilisation of the "Relief Detachments" is as follows: The President of the Society draws up detailed reports of the preparations made for the ensuing year. This report has to be submitted to the Ministers of War and of the Navy before the end of September, although the year to which it refers does not commence until the following April. The Ministers then assign fixed services for such Relief Detachments as may be needed in case of war, giving them definite positions in the system of mobilisation of the Army and Navy. The orders for mobilisation are then made out at the Headquarters of the Society. They are printed and stowed away, so that only the date, names, time and place of mobilisation have to be filled in before despatch. The distance of the abodes of the different members of the detachment is noted in a separate list, so that it is known exactly in how many hours orders can reach them. They must notify within a certain time that they have received their orders and whether they can comply with the order or not. In case they are prevented from doing so from illness they must submit a doctor's certificate. Separate orders are kept ready at headquarters for mobilisation in time of war, and for reviews, instruction and manœuvres in time of peace. The materials held ready for mobilisation consist of medical and surgical material, transport equipment, clothing and bedding for the *personnel* and for patients, and stationery. Articles subject to deterioration are secured by agreement with contractors. Other articles are stored at headquarters, except those required for Rest Stations, which are stored by the local branches.

Recruiting of the Society's Personnel.—The following notes (as well as much of the foregoing), are taken from Professor Ariga's report to the St. Louis Exhibition. Each member of the Society's *personnel* must be possessed of the following qualifications: (1) Good physical constitution; (2) full enjoyment of civil rights; (3) exemption from military service; (4) a height of not less than 5 feet (except in the case of the female *personnel*).

The following special qualifications are required for the various branches of work: (1) General Administrators, no special qualifications; (2) Managers must be between 30 and 50 years of age, and capable of administering the work of the Society; (3) Clerks must be between 25 and 40 years of age, and have acted previously as clerks of the Society, or have been Non-commissioned Officers of the Army or Navy and good at composition and arithmetic, or they must have been employed as accountants in Government offices or by private firms; (4) Doctors and Chief Apothecaries must be under 50 years of age, possess a licence to practise medicine or pharmacy, have completed their studies in the medical

faculty of one or other of the Imperial universities, or have finished a special course of study in one of the authorised schools of medicine; (5) Assistant Apothecaries must be between 20 and 40 years of age, and have been N.C.O.'s, in the Medical Corps of the Army or Navy, or be possessed of a certificate of having served for more than one year in the dispensary of a hospital or as a dispenser to a medical practitioner; (6) Chief Nurses (female), Chief Attendants (male), and Chief Stretcher-bearers, must be under 40 years of age, or, in the case of male *personnel* promoted from a lower grade in the Society, under 35 for Chief Attendant, and under 38 for Chief Stretcher-bearer; they must possess certificates of fitness for the post from the Society or have shown special talent; in the case of the male *personnel*, the posts may be given to men who have been N.C.O.'s in the Army or Navy Medical Corps; (7) Nurses (female), Sick Attendants (male), and Stretcher-bearers must have finished their regular course of training as student nurses, Sick Attendants, or Stretcher-bearers of the Society.

All the *personnel* of the Society as noted above are enrolled as "Reserve" doctors, apothecaries, nurses, &c., of the Society, and each must take a solemn oath in writing to keep himself or herself for a fixed number of years ready at any time to respond to the call of the Society for service in war or other calamity, or for instruction, manœuvres, &c. The number of years which the oath covers is five years for all except the female nurses and chief nurses, who contract for fifteen years, the male Sick Attendants who contract for ten years, and the Stretcher-bearers, who contract for seven years. At the end of the period of the "oath," the oath may be renewed provided the age limit has not been reached and the individual is physically fit. In the case of physical fitness the age limit may be extended. One of the characteristic features of the Red Cross Society of Japan is that the *personnel* recruited, trained and kept in reserve by this system of "oath," or contract, receive retaining fees. In this respect the Society differs from the voluntary organisations of European countries. In fact, as already indicated, the Society is composed of two classes, namely, the members who subscribe the funds, and the "Reserve *personnel*" who contract with the Society to give certain services, when required, in return for a retaining fee. The amount of this retaining fee is 36 yen (about £3 12s.) annually for Managers, Doctors and Apothecaries, 16 yen for Assistant Apothecaries, Chief Attendants and Chief Stretcher-bearers, and 12 yen for Attendants and Stretcher-bearers. The female staff receive no retaining fee, for two reasons: (1) They are given an expensive training by the Society; and (2) they can find ample remunerative employment as nurses when not serving with the Society. When called out for service, the *personnel* receive a special pay, which is stated to be higher than that of the corresponding grades in the Army Medical Service. There is also special provision for pensions, gratuities, &c., in case of invaliding, good service, or death.

Training of the Personnel.—The regulations for securing a *personnel* of trained doctors and apothecaries are appended. The training of female nurses forms the chief work of the Society in peace. The Society possesses for this purpose four hospitals. The principal hospital is in Tokio with 161 beds, the others are a 60-bed hospital in Nagano, and 30-bed hospitals in Miye and Shiga. Selected candidates must be between 17 and 30 years of age, and are entered as student nurses in the Society's hospitals. They receive uniforms and other articles, and a monthly allowance of 5 to 8 yen. The course of study lasts for three years, the first half being theoretical and the second half practical. At the end of the course an examination has to be passed before the "oath" is taken and the nurse enrolled as a "reserve" nurse of the Society.

The student nurses are supervised by members of the Ladies' Committee, and a Board has been created in the Society's hospital in Tokio, which is called the "Board of External Service of the Society's Nurses." All demands from external sources for the services of one of the Society's nurses has to be made to this Board, and the fees paid to it. A certain proportion is deducted for expenses, board, &c., and the balance given to the nurse.

The training of male sick attendants is carried out on similar lines, a monthly allowance of 8 to 15 yen being granted, besides uniform, &c. The training is, however, for ten months only, the first five in theoretical instruction in the Society's hospitals and the remaining five in practical work in one or other of the military hospitals. This form of practical instruction is considered of great importance, as it is in military hospitals under Army Medical control that the attendants are employed in time of war.

The training of the stretcher-bearers is also similar, but for three months only with an allowance of 15 yen monthly, uniform, &c. The course of training takes place at the hospital of the Society in Tokio, and consists of instruction in methods of transporting sick and wounded, and in improvising ropes, stretchers, &c., that may be of use in transport work. The first two months are occupied in theoretical and the last in practical work.

Strength of the Society's Personnel.—The following figures represent the present strength of the *personnel* of the Red Cross Society of Japan: Administrators, 5; Clerks, 87; Doctors, 314; Apothecaries, 124; Assistant Apothecaries, 5; Chief Nurses (female), 156; Nurses (female), 1,677; Chief Sick Attendants (male), 55; Sick Attendants (male), 713; Stretcher-bearers, 150.

In addition to the above there are 558 female nurses and 4 male attendants undergoing training, making a grand total of 3,848 trained *personnel* for the expansion of the Army Medical Service in time of war and supported by the voluntary contributions of the general population of the country.

During the recent war the activity of the Red Cross Society was briefly as follows: (1) The Ladies' Committee prepared bandages and first field dressings. (2) Ladies' Committees and local Commitees were present at railway stations, &c., to bid farewell to and welcome back troops going to and returning from the front. (3) Members of the Ladies' Committees helped trained nurses in the wards of hospitals in the home territory. (4) Transport columns were kept ready for Manchuria whenever required. (5) The Red Cross Society's Hospitals were handed over to the Army Medical Service. (6) The female relief or nursing sections were employed, according to Army Medical Service requisition, in the serious case wards and operation rooms of the Reserve Hospitals in the home territory, and on hospital ships, two of which were provided by the Society. (7) The male nursing sections were employed in hospitals of the Liao-tung garrison of occupation, and in the home territory.

APPENDIX I.

Regulations concerning Reserve Medical Officers and Pharmaceutists Engaged by Contract (*published August*, 1898).—Article 1.—The Red Cross Society guarantees the co-operation of Reserve Medical Officers and Pharmaceutists for unforeseen requirements in time of war or public calamities. Article 2.—They are engaged by the President, after an enquiry into their qualifications, by the head of the Society's hospital in Tokio, or by the heads of the Society's branches in the provinces. Article 3. —The contract is for a period of five years, during which they undertake to give their services in time of war or public calamity, whenever they are summoned to do so by the Central Committee in Tokio or by the competent authorities of local branches. Article 4.—Medical officers and pharmaceutists must fulfil the following conditions: (1) Chief medical officers must not be less than 30 or more than 50 years old; medical officers not less than 25 or more than 45; pharmaceutists not less than 20 or more than 45. They must also be free from liability to military service. (2) They must be physically robust and of good character. (3) Chief medical officers must have passed the course of instruction equal to that of graduate of medicine of the University; medical officers and pharmaceutists, the instruction equal or superior to that of graduate of medicine in the High Schools; and they must have authority to practise medicine and pharmacy. (4) Their past history must be irreproachable. Article 5.—Candidates for the position of Reserve Medical Officers must submit their applications in writing, along with a statement of their studies, to the Central Committee in Tokio, or to the authorities of a local branch. Article 6.—They are selected after the statement of their studies has been examined, and are appointed definitely if they fulfil the conditions of physical fitness. In the case of candidates

selected by a local branch, the statement of studies must be sent to the Central Committee, who will finally select and admit. Article 7.—When once a doctor or pharmaceutist is admitted he forwards his deed of contract to the Society, who in its turn sends him his certificate of appointment. Article 8.—The Reserve Medical Officers and Pharmaceutists are summoned to the Headquarters of the Society for a period of one or two weeks in order to study practical work in the Society's hospital. They may also be summoned without warning to take part in training for the duties of voluntary aid. Article 9.—They have a certain retaining fee during their period of engagement, and if they are called out in accordance with stipulations of the previous Article, they are reimbursed their travelling expenses. When they are called out for Service in time of war or public calamity, they are given a certificate as members of the voluntary aid *personnel*, and receive a salary the amount of which is fixed in advance; and during this time the retaining fee mentioned in the preceding paragraph is in abeyance. Article 10.—Reserve Medical Officers and Pharmaceutists who wish to continue their engagement may be appointed in accordance with Article 7 up to the age of 55 in the case of Chief Medical Officers, and up to 50 in the other grades. Article 11.—During war and public calamities the engagement may be extended beyond the period of contract or limit of age. Article 12.—In case of misconduct during their period of service they are liable to be dismissed, and their names and the cause of dismissal may be published. Articles 13 to 15 relate to change of address, travelling, entering Government Service, &c. Article 16.—On a medical officer or pharmaceutist being appointed, his name, age, address, &c., are entered in a register, which is kept corrected up to date. Article 17.—In the case of appointments by a local branch the form of register properly completed is forwarded to the Central Committee, where the corrections are made in the case of change of address or other personal conditions. Article 18.—When the engagement of medical officers or pharmaceutists belonging to a local branch is terminated or broken, the local branch must apply in writing to the President of the Society, who will then send the certificate of termination of contract to forward to the individual concerned. Article 19.—Medical officers and pharmaceutists who rendered good service during the war of 1894-1895 are appointed direct, provided they are of robust constitution. Article 20.—Reserve pharmaceutists will study the care of surgical instruments and antiseptic dressings according to the instructions issued by the Society.

Appendix II.

Distribution of the Relief Detachments, Transport Columns, Personnel of Hospital Ships, &c.

Where organised	Relief detachments with		Transport columns	Hospital ships		Supply depôt
	Female nurses	Male nurses		200 beds	100 beds	
Central Committee	Nos. 1, 2, 3	Nos. 99, 100	Nos. 1, 2, 3	2	2	1
Tokio	,, 4, 5	No. 101				
Hokkaido	,, 6, 7	,, 102				
Kioto	,, 8, 9	,, 103				
Osaka	,, 10, 11	,, 104				
Kanagawa	,, 12, 13	,, 105				
Hiogo	,, 14, 15	,, 106				
Nagasaki	,, 16, 17	,, 107				
Niigata	,, 18, 19	..				
Saitama	,, 20, 21	..				
Gumma	,, 22, 23	..				
Chiba	,, 24, 25	..				
Ibaraka	,, 26, 27	..				
Tochiki	,, 28, 29	..				
Nara	,, 30, 31	..				
Miye	,, 32, 33	..				
Aichi	,, 34, 35	No. 108				
Shizuoka	,, 36, 37	..				
Yamanashi	,, 38, 39	..				
Shiga	,, 40, 41	..				
Gifu	,, 42, 43	..				
Nagano	,, 44, 45	..				
Miyagi	,, 46, 47	No. 109				
Fuzishima	,, 48, 49	..				
Iwata	,, 50, 51	..				
Aomori	,, 52, 53	No. 110				
Yamagata	,, 54, 55	..				
Akita	,, 56, 57	..				
Fukui	,, 58, 59	..				
Ishikawa	,, 60, 61	No. 111				
Toyama	,, 62, 63	..				
Tottori	,, 64, 65	..				
Shimano	,, 66, 67	..				
Okayama	,, 68, 69	..				
Hiroshima	,, 70, 71	No. 112				
Yamaguchi	,, 72, 73	..				
Wakayama	,, 74, 75	..				
Tokushima	,, 76, 77	..				
Kagawa	,, 78, 79	No. 113				
Ehimo	,, 80, 81	..				
Kochi	,, 82, 83	..				
Fukuoka	,, 84, 85	No. 114				
Oita	,, 86, 87	..				
Saga	,, 88, 89	..				
Kumamoto	,, 90, 91	No. 115				
Miyagi	,, 92, 93	..				
Kagoshima	,, 94, 95	..				
Okinawa	,, 96	..				
Formosa	,, 97, 98	No. 116				

Appendix III.

Details of the Red Cross Society's Hospital Ships, "Hakuai Maru" and "Kosai Maru."

Gross tonnage	2,774	Width	39·2 ft.
Registered tonnage ..	1,267	Depth	18·7 ,,
Length	312 ft.	Speed	14½ knots.

The wards are as follows :—

First class cabins	36 beds	in 11	cabins.
Second class	12 ,,	3	,,
Third class	154 ,,	2	wards.
Isolation ward	6 ,,	1	,,

The accommodation for the staff is :—

1 cabin for the senior medical officer.
2 cabins for medical officers.
1 cabin for apothecary.
1 cabin for manager and clerk.
2 compartments for the female nurses.
2 ,, ,, male attendants.

The various offices, are :—

Clerk's office.	Operation room.	Medical storeroom.
Consultation room.	Antiseptic room.	Refrigerating chamber.
Dispensary.	Mortuary.	

Reviews.

ORGANOTHERAPY; OR, TREATMENT BY MEANS OF PREPARATIONS OF VARIOUS ORGANS. By H. Batty Shaw, M.D., F.R.C.P. Cassell and Co., 1905.

A good many attempts have been made recently to give a connected account of the modern revival of the treatment of disease by extracts of animal tissues. The task is not an easy one, as the literature of the subject is not only considerable, but has the disadvantage of being very fragmentary and diffuse.

Dr. Batty Shaw's hand-book, which is one of a new series of medical text-books on modern methods of treatment, published by Cassell and Co., is the most successful effort to give an account of the subject we have yet seen in our language. It certainly is the result of search through a wide range of literature and assiduous collection of references. This is, indeed, one of the most valuable points of this little text-book. The number of references given to the literature of the subject is great, and as the writer himself appreciates, it will afford a valuable guide to the bibliography of the subject.

The character of the book, however, implies its weakness. The observations made by those engaged in research, the innumerable criticisms made by writers, the references themselves follow each other in bewildering profusion, so that the connected and reasoned account expected in a text-book is obscured by the details of a bibliography.

The reader naturally turns to the principal chapters, and those on the thyroid and parathyroid glands, and on the suprarenal glands, occupy 168 pages of the 250 forming the actual text-book. Dr. Shaw's method is to treat first of the anatomy, second of the physiology, with special references to practical bearings, and finally of the actual therapeutic results. The conclusions dealing with the therapeutic action are those which will attract the most attention, and they will appeal to the reader as being of a helpful character. The other chapters of the book give an account of the much more incomplete and fragmentary information at our disposal of the action of the pancreas and liver, the testicle, ovary and kidney, the pituitary body, the thymus gland, the spleen, lymphatic glands, hæmo-lymphatic glands and bone-marrow, and finally of muscle, nerve tissue and placenta.

It will thus be seen that a very thorough review is given by Dr. Shaw. At the present time this text-book will prove useful to many; perhaps to the investigator as a means of reference, but especially to the practising physician who finds himself urged to make use of the innumerable drugs supplied by the manufacturer under the category of organic extracts.

THE TREATMENT OF GONORRHŒA IN THE MALE. By Charles Leedham-Green, M.B., F.R.C.S. Baillière, Tindall and Cox, London. Price 5s.

In the preface to this work the author says: "Although on the Continent several important monographs have recently been published dealing with this subject, but some years have passed since one appeared in England." As to this we would remark that within the last eighteen months, the Report of the Special Committee of the Advisory Board, Army Medical Services, which was appointed to consider the treatment of this among other venereal diseases, has been published. This Report enters fully into the most modern modes of treating gonorrhœa, both on the Continent and in England, and has brought it so far up to date as to leave little else to be said on the matter at present.

In the work under notice Dr. Leedham-Green expresses his opinion that "hand injections" are to be preferred to those by "irrigation," an opinion in which we cannot agree, as no one could pretend that they would be done as thoroughly by the former as by irrigation. Again, as regards the two methods of irrigation, *i.e.*, those of Diday and the other of Janet, he gives preference to the former, as being most easily accomplished. Here, again, we cannot hold with him, as we consider Janet's method most applicable in the general run of cases.

We quite agree with Dr. Leedham-Green that the risk of the posterior urethra becoming infected through irrigation of the anterior has been, to say the least, much exaggerated, as it seldom is the case, and further, our experience supports the statistics, which he gives, *i.e.*, of Jadassohn, Rona, Finger, and his own, that extension of inflammation to the posterior urethra in gonorrhœa is more often the rule than otherwise, irrespective of what form of treatment has been carried out, and that cases where the disease is arrested in the anterior urethra are the exception.

The chapter on chronic inveterate gonorrhœa and its treatment by combining irrigation with dilatation, is worthy of attention.

The book under review puts the treatment of gonorrhœa in a very concise manner, and ought to prove most useful to the general practitioner.

Current Literature.

Spirochæte Obermeieri.—In the *Journal of the American Medical Association*, January 13th, 1906, there appears a preliminary note on this micro-organism by F. G. Novy, M.D., and R. E. Knapp, B.S., which is of such scientific interest as to bear reporting in full.

The authors write: "The spirochæte studied was obtained through the kindness of Dr. Norris, of Bellevue Hospital, New York, who secured it from a case of relapsing fever by inoculating the blood into monkeys and white rats. The organism has been kept alive by successive passage through white rats for over two months. As a result of intraperitoneal injection the parasites appear in the blood in thirty-six to forty-eight hours after inoculation, disappear within the next twenty-four hours and do not reappear. The rats are then immune to subsequent inoculation. The disappearance of the spirochætes was shown to be due to the formation of anti-bodies. Spirochætal blood, when kept *in vitro*, retains its virulence for more than fifteen days.

"The blood of rats which have been given repeated injections of spirochætal blood exerts a most marked preventive and curative action. When injections of such blood are made, before inoculation with spirochætes, the latter fail to appear. Similarly, when simultaneous injections of immune and spirochætal blood was made no infection results. Even when the immune blood is injected ten, twenty-four and thirty-eight hours after inoculation with spirochætes, that is to say, at any time before the spirochætes actually should appear in the blood, they will fail to appear, whereas in the controls they become numerous.

"The curative action of the immune blood is equally pronounced. In rats which have from five to ten spirochætes per field of the one-twelth inch objective, an injection of 2 cc. of immune blood is followed *within one hour* by a total disappearance of the spirochætes from the circulation. After this, the parasites do not reappear, while in the controls they persist for twenty-four hours. This remarkable action of immune blood in the case of the white rat will form, without doubt, the basis of curative and preventive treatment in relapsing fever and in tick fever of Africa. It is the intention of the authors to work out the practical application of the principle discovered.

"Spirochætal blood, which has been diluted with ten parts of salt-citrate solution, when filtered through a Berkefeld filter, under a pressure of 50 lbs., yields a filtrate which, when injected into white rats, produces typical spirochætal infection. This result was obtained in seven out of ten experiments. The spirochætes, as in the case of cultures of *Trypanosoma lewisi*, are filterable through a Berkefeld filter. Attention is called to the importance of this fact in its bearing on the so-called ultramicroscopic organisms.

"All attempts thus far to cultivate the spirochæte on blood agar have failed, but this subject will be followed further. The spirochætes multiply by transverse division and show other characteristics which belong to bacteria, notably, their behaviour with reference to distilled water. When

rat blood, which is rich in spirochætes, is placed in a thin collodium sac and dialysed in running distilled water, the organisms do not undergo any change in form even after twenty-four hours. During the first five or six hours their motility is unimpaired, but after that they become more and more sluggish and finally come to rest. Even after a dialysis of eleven to twenty-four hours such blood is infective. Under similar conditions the rat and nagana trypanosomes rapidly plasmolyse, within an hour or two, and become hardly recognisable. At the same time they lose their infectiveness.

"This behaviour of the spirochætes in distilled water, that is, absence of marked plasmolysis, corresponds to that of bacteria under like conditions. This test may, perhaps, serve as a more or less general means of differentiating between bacteria and protozoa. The transverse division of spirochætes, the absence of definite structure, such as the presence of well-marked nucleus and blepharoplast, and the absence of plasmolysis, would indicate that the *Spirochæte obermeieri* belongs to the group of bacteria.

"On the other hand, the transmission of spirochætal diseases by insects, the persistence of the organisms in such insect hosts for months, and the infection of their eggs, are the main facts known at present which point to a possible protozoal nature of the parasites. The persistence of the spirochætes of tick fever in the blood of rats for three to eight days, as shown by Dutton and Todd, would indicate that their organism, though closely related, is nevertheless different from that studied by us. It goes to show that the tick fever of Africa and the relapsing fever of Europe are due to different species of spirochætes."

African "Tick Fever."—Koch, in the *Berliner Klinische Wochenschrift* of February 12th, 1906, gives an account of his recent investigations on tick fever in German East Africa. The disease is common in this country, attacking both natives and Europeans, especially those travelling over the main caravan routes running inland from Dar-es-Salam. Prior to Koch's arrival Kudicke had succeeded in giving the disease to monkeys by inoculation of human blood containing spirochætes, but had failed to confirm the work of Dutton and Todd in infecting monkeys by the bites of ticks, neither had he found spirochætes in any of the ticks he examined; but Koch, aided by his experience gained while working with Texas fever and coast fever of cattle, was successful in demonstrating spirochætes in ticks collected from the infected districts. These spirochætes, which resemble those of relapsing fever, he found not in the stomachs but in the ovaries of the ticks. The tick in question proved to be the *Ornithodorus moubata*, belonging to the group named *Argassidæ*, whose distinguishing feature it is to seek their host only to feed, hiding in his neighbourhood at other times; they are thus very different in habit from the other group of ticks, the *Ixodidæ*, who remain fixed on their host for the greater part of their life. After a short account of the life-history of *Ornithodorus moubata*, Koch ~~Kudicke~~ gives some interesting particulars of their habits. They appear to live exclusively in human habitations, native huts, shelters, &c., and are only found when the interior of such huts is perfectly dry, any leakage of rain or any fouling of the floors by goats, which are often lodged in the huts to protect them from wild beasts, keeping them away.

They are nocturnal in habit, and, after gorging themselves with blood, bury themselves in the soil forming the floor of the hut. They appear to bite only man, under natural conditions, but will readily feed if placed on the shaved skin of a monkey. They are easily kept in captivity in a bottle half to quarter full of dry earth, in which they bury themselves, and will fast as long as six months. They are mostly found in the earth at the foot of the posts supporting the roof, under bed places and the threshold—where the natives sit in the evening—but it requires the experienced eye of the native to secure large numbers, owing to their inconspicuous colour and their habit of shamming dead when disturbed.

The characters of the fever are identical with those of relapsing fever, with the exceptions that the attacks are shorter—two to three days as against six to seven—and that the number of spirochætes found in the blood is usually very small, often only two or three in a whole film.
Koch. But ~~Kudicke~~ considers that tick fever is identical with relapsing fever, or that, at the most, it may be called an African variety of relapsing fever. He saw no fatal cases, but in monkeys the spleen was always enlarged and contained infarcts, while microscopically the spirochætes were seen to be contained in phagocytes, as occurs in relapsing fever. The spirochæte itself resembles *Spirochæte obermeieri*, but is somewhat
Koch longer. ~~Kudicke~~ failed to demonstrate any of the structures recently described by Schaudinn[1] in other spirochætes, flagella, undulating membrane, &c., and could not agree with Schaudinn as to their protozoal nature. On the contrary, he regards them as bacteria which multiply by median and not by longitudinal fission.

Proceeding to investigate the manner in which ticks transmit the
Koch disease, ~~Kudicke~~ made the following observations. After ticks have been fed on infected blood of men or monkeys no increase of numbers or alteration in size is observed in the spirochæte contained in the tick's stomach for two days; on the third and fourth day their numbers rapidly diminish, and none are found after the fifth day. Since, however, the spirochætes are found in very large numbers in the ovaries of ticks found in native huts a subsequent multiplication must be assumed to
Koch occur. ~~Kudicke~~ further found spirochætes present in a certain proportion (quarter to one-fifth of the eggs laid by infected ticks, and noted an increase in their numbers up to the twentieth day; beyond this period they could not be differentiated, owing to the cellular proliferation accompanying development, and ~~Kudicke~~ was therefore unable to decide whether Koch
they finally reach the salivary glands, biting apparatus or other situation suitable for inoculation into the human or other host. In any case, the youngest ticks are infective, and give the disease to monkeys on which they are fed. This important observation ~~Kudicke~~ and his colleagues Koch
have repeated many times with the same result, and regard it as established beyond doubt. The independent work of Dutton and Todd on the same lines is referred to, and Dutton's death is spoken of in sympathetic terms.

To determine the distribution of the disease, the percentage of infected
Koch ticks, &c., ~~Kudicke~~ travelled some distance into the interior along the

[1] *Deutsche Med. Wochenschrift*, October 19th, 1905. An abstract of this article appeared in the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, vol. v., p. 761.

caravan routes. Infected ticks were found in almost every village and hut; of 645 ticks examined, 71 contained spirochætes, a percentage of 11. The highest percentage found was 50. In addition, ~~Kudicke~~ found Koch infected ticks in villages far from the caravan routes, where whites or Arabs hardly ever come, and concludes that the disease is probably widespread over the whole of German East Africa as well as in Uganda and the Congo, where it has been found by English observers. He notes as curious the large percentage of infected ticks found in houses where no sickness had occurred for some time, and thinks this may be due to an acquired immunity following on infection in early youth. The number of infected ticks is also disproportionate to that of the cases of fever; possibly this may be due to the persistence of spirochætes in the blood of convalescents for long periods, perhaps for years, or there may Koch be an alternative host. Thus, ~~Kudicke~~ has succeeded in "passaging" spirochætes through mice by intraperitoneal inoculation, and has also infected rats by the bite of ticks; it is possible, therefore, that such animals may be naturally infected, and may play a part in the transmission of the disease similar to that of rats in plague. In studying the Koch disease in monkeys ~~Kudicke~~ found that if they recovered they had acquired immunity against a fresh infection, but he does not mention the length of time since recovery in the case of the animals investigated.

Prevention of the disease is easy by avoidance of the sites known to be frequented by ticks; thus, by pitching their tents twenty to thirty Koch yards away from native huts or shelters, ~~Kudicke~~ and his party escaped infection, while of five native servants who slept regularly in such huts four contracted the disease. These servants came from the coast, where Koch neither ticks nor tick fever are prevalent, and ~~Kudicke~~ assumes that they had not therefore acquired immunity to the disease as the forty or fifty native carriers who accompanied his party had apparently done, since the latter, though sleeping in native huts and shelters throughout the journey, had no case of tick fever among them.

W. B. Leishman.

The Occurrence of Schistosoma Japonicum Vel Cattoi in the Philippine Islands. (By Paul G. Woolley, *The Philippine Journal of Science*, January, 1906.)—In 1887 a peculiar form of cirrhosis of the liver due to some unknown parasite was described by Mazima in Japan. In later cases ova were found in other organs besides the liver, and further observation showed the existence of a definite endemic disease, more or less confined to the provinces of Bingo, Yamanashi, Hitoshima and Saga, which is known in Japan as "Katayama" disease, after a town in the province of Bingo.

In 1904 Katsurda found ova similar to those of *Schistosoma hæmatobium* in five of fifteen cases of this disease which he examined, and later on found flukes (in the portal system of a cat from the infected districts), which he proposed to name *Schistosoma japonicum*. In the same year Fujinami found a female parasite in a human subject, and also Catto (now of the I.M.S.) discovered ova in the body of a Chinaman, afterwards recognised to be those of a schistosoma, and described by him as such in 1905. These worms are distinguished from the ordinary *S. hæma-*

tobium by the absence of the ciliated warts in the integument,[1] and by certain minor differences, the ova also are smaller, blunter and without spines.

So far, the clinical descriptions must be based on the Japanese reports, the only material as yet available. In affected children defective physical development is the rule, diarrhœa is usually the first symptom noted, followed by progressive anæmia and severe ascites. The most striking feature is the shape assumed by the trunk, shrinking of the hypogastrium, with enlargement of the epigastrium (the two being separated by a transverse furrow immediately above the umbilicus), producing an appearance like an inverted gourd. This dilatation of the epigastrium and lower part of the thorax occurs even in patients in whom great enlargement of the liver and spleen have not taken place. An initial enlargement of the liver is followed by a decrease in size, the enlargement of the spleen is apparently secondary to that of the liver. The diarrhœa becomes mucosanguineous. Ova of schistosoma, and of other intestinal parasites, have been found in the stools of these cases.

Pathological Anatomy.—In the Japanese cases the liver was diminished in size, surface nodular, capsule thickened. Increase of connective tissue, and round-celled infiltration of the capsule, with ova in the lumen or walls of the portal capillaries and in the connective tissue. Less common are fibrous nodules and tubercle-like areas in the parenchyma, containing ova. Ova are also found in the intestine (especially the large), in the submucous coat, often in such numbers as to cause the tissue above them to bulge out or even to be eroded. They are also found in the mesentery, mesenteric glands, lungs and brain, in the two last situations in tubercle-like masses surrounded by round-celled infiltration and new connective tissue. In one case new growths were found in the rectum and sigmoid like those found in bilharzial disease. In Catto's case the liver and spleen were both enlarged, the appearances were generally as described above, but the mucous membrane of the colon was swollen, hyperæmic, friable, and showed superficial ulceration and necrosis. The mesenteric and many intrapelvic glands were much enlarged. The rectum and appendix were the parts of the intestine most affected. Adult parasites were found in the blood-vessels of the meso-colon, and in small groups at the bifurcations of the small mesenteric vessels.

The author describes a fatal case of amœbic dysentery complicated with pulmonary abscess in which amœbæ were recovered from the intestinal ulcers but not from the abscess in the lung. Ova of uncinaria were also found in the intestinal contents, and in the intestinal wall, ova of *Schistosoma japonicum* chiefly in the submucous coat, fewer in the mucous, still fewer in the subperitoneal tissue, and none in the muscular layer. These ova were found also in the liver, and in very small numbers in the tissue surrounding the pulmonary abscess.

Katsurda examined from 30 to 54 cases every year while stationed in the endemic area. He observed only three to five deaths annually directly attributable to the parasite, but thinks the indirect mortality much higher. He believes the disease to originate from stagnant water in the rice-fields;

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[1] See Menses, *Handbuch der Tropenkrankheiten*, vol. i., p. 100, for an excellent picture of *S. hæmatobium*.

where artesian well water is used, and people do not wade in the rice, the disease is becoming less common. The author agrees with this suggestion and points out the importance of the use of human excreta as a manure in this connection. The distribution of the ova in the body suggest infection through the gastro-intestinal tract. The author points out that the disease so produced may at certain stages be confused with tropical splenomegaly, ankylostomiasis, or amœbic dysentery, and that it may be found to extend over a wider area than is at present known. No information is given concerning the condition of the blood.

[Note.—Sandwith "Medical Diseases of Egypt" says that he has seen several cases of bilharzial cirrhosis of the liver accompanied by ascites, in which there were bilharzial growths in the rectum, and in some of these which proved fatal a "distinct peri-portal cirrhosis of the bilharzial type." Symmers gives an account of the pathological condition in the liver (*Journal of Pathology and Bacteriology*, vol. ix., p. 237) which corresponds closely with that seen in the Japanese cases].

R. J. S. Simpson.

ERRATA.

In the abstract on "African 'Tick Fever,'" April number, Vol. VI., page 482, with the exception of the single reference to Kudicke in the sixth line, Koch's name should replace that of Kudicke throughout.

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Original Communications.

REPORTS OF THE COMMISSION APPOINTED BY THE ADMIRALTY, THE WAR OFFICE, AND THE CIVIL GOVERNMENT OF MALTA, FOR THE INVESTIGATION OF MEDITERRANEAN FEVER, UNDER THE SUPERVISION OF AN ADVISORY COMMITTEE OF THE ROYAL SOCIETY.

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(Continued from page 402.)

MOSQUITOES AS A MEANS OF DISSEMINATION OF MEDITERRANEAN FEVER.

BY MAJOR W. H. HORROCKS AND CAPTAIN J. CRAWFORD KENNEDY.
Royal Army Medical Corps; Members of the Mediterranean Fever Commission.

EPIDEMIOLOGICAL enquiries having shown that while the consumption of infected milk may, and probably does, account for much of the Mediterranean fever amongst the Maltese, yet many cases occur among the military and naval populations in Malta which cannot be attributed to this cause. Accordingly, a study of mosquitoes as possible carriers of the *Micrococcus melitensis* was commenced. The work done may be arranged in three parts:—

Part I.—A study of the species of mosquitoes found in Malta, and their distribution in the island.

Part II.—Examination of the species to determine whether any of them act as carriers of the *M. melitensis*.

Part III.—Experiments to determine whether any of the species are capable of conveying infection from cases of Mediterranean fever occurring in man to healthy monkeys, or from infected to healthy monkeys.

I.—Study of the Species of Mosquitoes found in Malta.

Mosquitoes were caught in the Military Hospital, Valletta; Military Hospital, Cottonera; Military Hospital, Citta Vecchia; Military Hospital, Imtarfa; Fort Chambray, Gozo; Military Hospital, Forrest Hill; Floriana Barracks; Civil Hospital, Floriana; Naval Hospital, Bighi; Fort Ricasoli; Barracks, Lower St. Elmo; Sliema; Birchircara; Barracks, Imtarfa; Barracks, Cottonera. The following species were recognised: *Culex pipiens, C. fatigans, C. spathipalpis, Stegomyia fasciata, Acartomyia zammitii.*

All the species, except *C. spathipalpis*, were found at times full of blood. *A. zammitii* and *S. fasciata* attack human beings both day and night, while *C. pipiens* and *C. fatigans* only become troublesome at night.

The distribution of the mosquitoes found was chiefly as follows:

Military Hospital, Valletta: *C. pipiens, C. fatigans* (very few), *A. zammitii, S. fasciata* (these are very rare after the end of September).

Military Hospital, Cottonera: *C. pipiens, C. fatigans, C. spathipalpis, A. zammitii, S. fasciata.*

Military Hospital, Citta Vecchia: *C. pipiens*; *C. spathipalpis, S. fasciata* (comparatively rare).

Military Hospital, Imtarfa: *C. pipiens* (very common), *C. spathipalpis* (rare).

Fort Chambray, Gozo: *C. pipiens, C. fatigans, A. zammitii.*

Floriana Barracks: *C. pipiens.*

Civil Hospital, Floriana: *C. pipiens, C. fatigans, S. fasciata.*

Ricasoli Fort: *C. fatigans, C. pipiens, A. zammitii, S. fasciata.*

Lower St. Elmo Barracks: *C. pipiens, A. zammitii, S. fasciata.*

The *A. zammitii* breeds in the salt pools found close to the sea, and it appeared important to determine whether this mosquito invades the small towns and barracks in the interior of the island. More than six hundred mosquitoes were collected from Citta Vecchia and Imtarfa, and yet *A. zammitii* was never found once among them. Severe outbreaks of Mediterranean fever having occurred at both these places, the distribution indicates that, even

if Mediterranean fever be a mosquito-borne disease, the probabilities are against *A. zammitti* being an important infecting agent.

The seasonal prevalence of the mosquitoes is also interesting in view of the fact that cases of Mediterranean fever occur amongst the military and naval garrison during the winter months. Looking at the question from this point of view, the *C. pipiens* would appear to be likely to play an important part in conveying infection.

II.—Examination of Mosquitoes to Determine whether any Species Act as Carriers of the *M. melitensis*.

The following procedure was adopted in the examination of mosquitoes. Specimens full of blood were caught in boxes and stupefied with chloroform. Each mosquito was then placed on a sterile glass slide, and needles being placed on the thorax and penultimate segment of the abdomen, gentle traction was exerted. With a little practice it was found possible to completely separate the parts, and leave the coagulated blood on. the slide practically free from all contaminating fluids contained in the body of the mosquito. A few drops of sterile water were now added to the blood, and the whole was thoroughly mixed. The fluid was then drawn up in a sterile pipette, and transferred to litmus-nutrose-glucose-agar plates, and carefully spread over the surface of the medium. The plates were then incubated at 37° C., and examined in the usual way at the end of four days.

The first recovery was made on September 4th by one of us (H.) from a mosquito (*C. pipiens*) caught full of blood in the Lazaretto. One plate, made in the manner described above, contained thirty-four colonies of the *M. melitensis*. The micro-organism recovered was subjected to the most rigorous tests, and its pathogenicity was proved by injecting the growth on an agar slope obtained from one of the colonies on the plate (see Monkey C).

The second recovery was made on September 15th (by K.) from a *S. fasciata* caught full of blood in the Mediterranean fever wards of the Military Hospital, Valletta. One plate contained twenty-four colonies of the *M. melitensis*. The pathogenicity of this culture was also tested (see Monkey 101).

The third recovery was made (by H.) on September 23rd from a *C. pipiens* caught in the Mediterranean fever ward at the Naval Hospital, Bighi. The plate contained 100 colonies of the *M. melitensis*.

The fourth recovery was made (by H.) on September 24th from a *C. pipiens* caught in the Civil Hospital, Floriana. The plate in this case only contained four colonies of the *M. melitensis*.

It was noticed that, though several plates were inoculated with the blood from the mosquito, all the colonies on each occasion appeared in one plate.

Bearing in mind the work done by Shaw, Zammit, and Gilmour on the blood of patients suffering from Mediterranean fever, the number of colonies which appeared to be present in the small quantity of blood contained in the mosquitoes is very remarkable, and suggests that either the *M. melitensis* undergoes multiplication in the mosquito, or else the Micrococci are phagocyted in corpuscles which are broken up by the manipulations on the glass slide.

The following tables show the number and species of the mosquitoes which have been dissected up to the present time :—

TABLE A.—(MOSQUITOES DISSECTED BY H.).

	C. pipiens.	*C. fatigans*	*S. fasciata*	*A. zammitii*	Total
Military Hospital, Valletta ..	6	—	3	11	20
Civil Hospital, Floriana	63	—	24	—	87
Naval Hospital, Bighi	13	—	7	5	25
Military Hospital, Citta Vecchia	93	—	2	—	95
,, ,, Imtarfa ..	6	—	—	—	6
Barrack Room, Citta Vecchia ..	8	—	—	—	8
Military Hospital, Forrest ..	4	—	2	—	6
,, ,, Cottonera ..	13	—	—	—	13
Barracks, St. Andrews	4	—	—	—	4
,, St. Elmo	—	—	3	—	3
Lazaretto, Manoel	3	—	1	—	4
Barracks, Floriana	4	—	—	—	4
Total	217	—	42	16	275

Three recoveries of *M. melitensis* were made out of 275 mosquitoes dissected. It should be noted, however, that ninety-five mosquitoes were collected at Citta Vecchia, where the cases of Mediterranean fever are mostly chronic, Citta Vecchia being a kind of sanatorium for the acute cases treated in Valletta and Cottonera. There were also few acute cases in the Civil Hospital, Floriana, at the time when the eighty-seven mosquitoes were collected there.

TABLE B.—(MOSQUITOES DISSECTED BY K. UP TO END OF OCTOBER, 1905.)

Hospital	*C. pipiens*	*C. fatigans*	*Stegomyia*	*Acartomyia*	Total
Military Hospital, Valletta ..	109	3	45	32	189
Cottonera	5	1	—	—	6
Citta Vecchia	159	—	1	—	160
Imtarfa	20	—	—	—	20
Civil Hospital, Valletta	40	—	14	—	54
Naval Hospital, Bighi	2	—	—	—	2
Total	335	4	60	32	431

The mosquitoes in Table B were all captured in wards containing Mediterranean fever patients.

Out of the total of 431 from these infected places, only one was found to contain *M. melitensis*. This was a Stegomyia, caught in 20A Ward, Valletta Military Hospital, on September 15th. Twenty-four colonies of the microbe were obtained from the stomach.

TABLE C.—MOSQUITOES CAUGHT IN PLACES WHERE THERE WERE PRESUMABLY NO MEDITERRANEAN FEVER PATIENTS (DISSECTED BY K. UP TO THE END OF OCTOBER).

Place	*C. pipiens*	*C. fatigans*	*C. spathipalpis*	*Stegomyia*	*Acartomyia*	Total
Military Hospital, Valletta ..	58	1	—	9	4	72
,, ,, Cottonera ..	8	1	—	1	—	10
,, ,, Imtarfa ..	6	—	1	—	—	7
,, ,, Citta Vecchia	44	—	—	—	—	44
,, ,, Forrest ..	4	1	—	4	3	12
Floriana Barracks	9	—	—	—	—	9
Lower St. Elmo Barracks ..	6	—	—	3	13	22
Fort Ricasoli	7	1	—	2	1	11
Gozo	—	—	—	—	1	1
Valletta	1	—	—	1	—	2
Total	143	4	1	20	22	190

No *M. melitensis* was recovered from any of these.

The *M. melitensis* was only recovered from four out of a total of 896 mosquitoes dissected. It must, however, be noted that some 255 mosquitoes were obtained from Citta Vecchia, where the cases of Mediterranean fever are mostly chronic, and about 200 other mosquitoes were caught in places where there were no known cases of Mediterranean fever. Deducting these numbers from the

total, the result would be four infected mosquitoes out of about 450 mosquitoes collected in presumably infected places.

This result was not unexpected; considering the small numbers of the specific Micrococci which are found in the peripheral blood of Mediterranean fever patients, mosquitoes could not possibly be infected in great numbers, or Mediterranean fever would be much more prevalent than it is at present.

Experiments to Test the Virulence of the M. melitensis *isolated from* C. pipiens *and* S. fasciata.

C. pipiens. *Monkey C.*—The monkey used in this experiment was brought from Calcutta and kept under observation for nearly two months before the experiment was commenced. Its blood was tested on many occasions, but no signs of a reaction with the *M. melitensis* were observed. On September 4th one of the colonies on the nutrose-agar plate, made with blood from the *C. pipiens* caught in the Lazaretto, was planted on an agar slope, and on September 19th the growth resulting, emulsified in salt solution, was injected subcutaneously into Monkey C. A wave of fever followed, and on September 29th the blood reacted in a dilution of 1—10. On October 11th the blood serum, diluted 1—50, was found to cause immediate agglutination of the *M. melitensis.* On October 14th the monkey was killed. Cultures were made from the spleen, kidneys, liver, bile, mesenteric, femoral, and axillary glands, and heart's blood. The micro-organism was recovered from the spleen and heart's blood; it was also found in considerable quantity in all the plates from the glands. This monkey was also used for experiments on the conveyance of infection by mosquitoes.

Remarks.—The wave of fever, blood reaction, and recovery of *M. melitensis* from the organs show that the culture isolated from *C. pipiens* was undoubtedly virulent.

S. fasciata. *Monkey No.* 101.—Monkey No. 101 had been under observation for several weeks, and its blood repeatedly tested, with negative results, before the experiment was commenced.

The *M. melitensis* was isolated from the mosquito on September 15th and subcultured on September 19th. On September 24th an emulsion of the growth on an agar slope was injected subcutaneously into Monkey No. 101. A well-marked wave of fever resulted. On the sixth day after the injection the blood serum

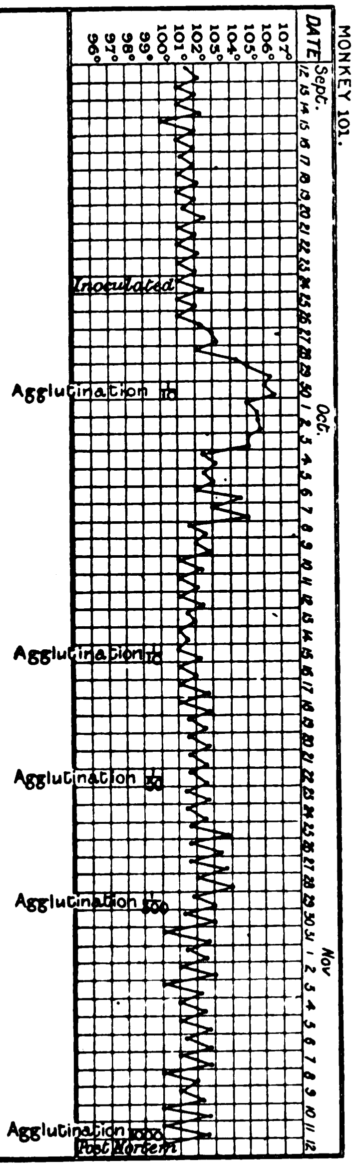
gave a complete reaction in a dilution of 1—10, and the temperature rose to 106·8°F. On October 15th the temperature fell to the "normal level," but a few days later an irregular secondary wave of fever set in and the agglutination reaction increased. On October 22nd the working dilution of serum was 1—50, and on the 29th 1—300. On November 12th the monkey was killed with chloroform. The blood serum, tested just before death, was found, when diluted 1—1,000, to cause immediate agglutination of the *M. melitensis*. The microbe was recovered in great profusion from the spleen and lymphatic glands, in less quantity from the liver, and very sparsely from the kidney. Each of six broth tubes, inoculated with 0·5 cc. of blood from the heart, was found to contain the Micrococcus. This monkey was also used for experiments on the conveyance of infection by mosquitoes.

Remarks.—The marked wave of fever, strong blood reaction, and the presence of the *M. melitensis* in the blood and all the viscera show that the culture isolated from the *S. fasciata* was very virulent. The chart (p. 494) shows the wave of fever during the experiment.

III.—To Determine whether *C. pipiens* and *S. fasciata* can Convey the Infection of Mediterranean Fever from Monkey to Man, Man to Monkey, and Monkey to Monkey.

Conveyance of Infection from Monkey to Man.—This experiment was not designed, but occurred in the following manner. On October 1st Monkey No. 6, infected by feeding, was being examined (by H.) in the verandah of the Lazaretto. Carlo Mifsud, the attendant in the Lazaretto, suddenly pointed to a mosquito, full of blood, resting on the table, and said: "That mosquito has just bitten me and I could not brush it away without letting go the monkey." The mosquito was at once captured and dissected, with the results already detailed under the first recovery of the *M. melitensis* from *C. pipiens*. On the day the mosquito was captured Carlo's blood was carefully examined, but no reaction with the *M. melitensis* was obtained. His temperature was also taken and found to be perfectly normal. The boy declared that he was perfectly well, and was much amused by the examination to which he was subjected. On October 11th he complained of feeling ill and returned to his home in Birchircara. On October 18th he was found to be suffering from fever and his blood serum caused

immediate agglutination of the *M. melitensis*. The boy still has fever (November 20th), temperature ranging between 102° and 103° F., and is undoubtedly suffering from a typical attack of Mediterranean fever. He stated that he had constantly drunk unboiled goat's milk obtained from F., of Balzan; but for some twelve weeks before his illness he was employed from 7 a.m. to about 8 p.m. in the Lazaretto, and whilst working there he obtained milk from healthy goats which were being kept under observation for future experiments. He also stated that there were no cases of fever in his house at Birchircara. The infection of the mosquito might easily have been acquired from the infected monkeys in the Lazaretto. At the time there were several monkeys which had been infected by feeding and by subcutaneous injection, and whose blood yielded the *M. melitensis* on culture. As soon as monkeys became infected it was the custom to bring them daily out of the dark mosquito-proof rooms into the verandah for better observation. It is not difficult to imagine that the mosquito which bit Carlo Mifsud had previously fed on these monkeys and so had taken the *M. melitensis* into its stomach.



Conveyance of Infection from Cases of Mediterranean Fever occurring in Man to Healthy Monkeys. Experiment I. Conveyance of Infection by C. pipiens.—On August 21st a batch of mosquitoes bred out from larvæ were fed on a patient in the Valletta Hospital. There were about fifty of them in the cage and many were found

full of blood. On the evening of August 23rd they were fed on Monkey No. 22. On the same day another batch of mosquitoes was fed on a patient in the Valletta Hospital; on August 24th and 25th this batch was fed on Monkey No. 22. The feedings were done in the evening, but it was noticed that very few of the mosquitoes attacked the monkey. It was therefore decided to place the healthy monkey in a mosquito-proof cage and let the mosquitoes loose inside the cage. Accordingly, on August 31st this was done and another batch of mosquitoes fed on a patient was also let loose at the same time. On September 4th another batch was set free in the cage. On September 19th still another batch of mosquitoes was let loose. A jar full of water was placed on a bracket inside the mosquito cage, and many larvæ were eventually found in the water. The blood of Monkey No. 22 was carefully examined once a week for a reaction until October 25th, when a severe attack of dysentery set in. On November 17th the monkey, being *in extremis,* was killed with chloroform. At the *post-mortem* examination miliary tubercles were found in the organs, and the liver was "waxy." Cultures were made in the usual manner, but the *M. melitensis* was not isolated.

Remarks.—In this experiment over 250 mosquitoes were employed, but not more than half of them absorbed blood from the Mediterranean fever patients. Careful examination of the mosquitoes in the cage occupied by the monkey was made from day to day, but none of them were noticed full of blood.

Experiment II.—This was conducted on the same lines as No. 1, with the exception that the monkey was placed in a small mosquito-proof box instead of a large cage, the idea being to bring the mosquitoes in more intimate contact with the monkey. The box had a double bottom, the upper being made of narrow bars and the lower of solid wood. Flat dishes containing water were placed in the space below the narrow bars. At intervals of forty-eight hours mosquitoes were placed in the cage. About 300 mosquitoes, which had fed on patients, were used, but of these only eighty containing blood were counted. Monkey No. 18 was used in this experiment and its blood was tested weekly for a reaction with the *M. melitensis.* It became seriously ill in October and was chloroformed on November 17th. At the *post-mortem* examination a condition of things very similar to Monkey No. 22 was found. Cultures were made in the usual manner, but no signs of *M. melitensis* appeared.

Conveyance of Infection by C. pipiens *from Infected to*

Healthy Monkey.—A small box covered with mosquito netting was divided into two compartments by wire-netting fastened below to a board let into a groove in the floor; a false bottom made of wire was put in each compartment. These precautions were taken in order to prevent the passage of urine from one side of the box to the other. Monkey C, suffering from a wave of fever, having been placed in one compartment and Monkey No. 3, quite healthy, in the other, about 400 mosquitoes were let loose in the compartment occupied by Monkey C. Next day 200 more mosquitoes were introduced. Unfortunately Monkey No. 3 died suddenly four days after the experiment was commenced. Another healthy monkey was then placed in the box and every day for a week batches of about 200 mosquitoes were let loose in the cage. The healthy monkey never showed any signs of infection.

Conveyance of Infection by S. fasciata. *Experiment I.* (from man to monkey).—Monkey No. 16 was placed in a large mosquito-proof box, and 200 mosquitoes, which had fed on patients in the Cottonera Hospital, were placed in the cage. The mosquitoes remained alive for a week. The blood of the monkey was repeatedly examined, but no signs of a blood reaction were observed, though the monkey was kept under observation for two months.

Experiment II. (from man to monkey).—A cage containing over 100 mosquitoes was placed on a patient in the Cottonera Hospital on October 2nd. On October 4th, 5th, and 6th, the cage was placed on Monkey No. 17. On each occasion some of the mosquitoes were noted to feed freely. On October 6th a cage full of mosquitoes, fed forty-eight hours previously on a patient in the Valletta Hospital, was placed on the monkey. On October 7th, 8th, 9th, and 10th, the cage was again applied to the monkey. The blood of Monkey No. 17 has been subjected to repeated examination, but no signs of a blood reaction have been observed up to the present time.

Experiment III. (from monkey to monkey).—On September 30th a cage full of mosquitoes, bred from larvæ, was placed on Monkey No. 101, then at the top of a wave of fever. Next day the cage was again placed on Monkey No. 101, so as to ensure as far as possible that all the mosquitoes should have an opportunity of taking up blood. On October 3rd and 4th the mosquitoes were fed on Monkey No. 14. On October 5th and 6th the mosquitoes were again placed on Monkey No. 101, but on both days many dead mosquitoes were found in the cage. On October 7th the mosquitoes still alive were fed on Monkey No. 14. On October 9th all the

mosquitoes were found dead. Monkey No. 14 has been kept under observation up to the present time, but the serum has never reacted.

Remarks.—The results of the experiments were disappointing, but not unexpected. The dissections of mosquitoes obtained from the wards containing Mediterranean fever patients showed that under the most favourable conditions not more than 1 per cent. would carry the *M. melitensis.* In the experiments on the conveyance of infection from man to monkey, endeavours were made to feed as many mosquitoes as possible, but it was practically impossible to feed more than 300 mosquitoes at one time on the patients in the wards, and of these probably not more than one-half would take up blood at the first feeding; so that even with this large number of mosquitoes there was only a probability that one would carry the infecting microbe.

In the conveyance of infection from monkey to monkey, the feelings and interests of the patients did not militate against the use of any desired number of mosquitoes, but the monkey experiments presented their own peculiar difficulties. The attempts to isolate the *M. melitensis* from the blood of infected monkeys clearly showed that the specific microbe was present in the blood to a small extent, and that it appeared at very uncertain periods after infection had taken place, as judged by the serum reaction. The *M. melitensis* also did not seem to persist in the blood for any long period after its recovery. From the fifth to the tenth day after the appearance of the agglutination was found to be the best time for its recovery from the blood. Though often the attempts made during life to isolate the Micrococcus proved failures, yet the specific microbe was occasionally found in the blood obtained at the *post-mortem* examination. Again, monkeys displayed an enormous difference in their powers of resistance to infection; for instance, Monkey No. 110, intended for mosquito experiments, could not be infected, though he received subcutaneously at various times the growth of *M. melitensis* on six agar slopes. Mosquitoes also did not display the same predilection for monkeys as they did for man. It was often noticed that a cage full of *C. pipiens* might be left for two hours in contact with a monkey, and not a single mosquito would bite. If, however, the same cage were transferred at once to the skin of man, the mosquitoes would commence to feed.

Conclusions drawn as to the Mode of Entrance of the M. melitensis *into the Human Body, based on the Work done up to End of November*, 1905. (W. H. H.)

(1) There is no evidence that Mediterranean fever can be contracted by contact with cutaneous surfaces uncontaminated by urine.

(2) Infection can be acquired by the absorption of urine secreted by cases of Mediterranean fever, and this is probably one way in which workers in hospital become infected.

(3) There is evidence to show that monkeys can be infected by dry dust artificially contaminated with cultures of *M. melitensis* isolated from the spleen of cases of Mediterranean fever. The path of absorption may be through the nares, throat, respiratory passages, and alimentary canal. Dry dust contaminated with the urine of cases of Mediterranean fever has given rise to infection in goats, but, up to the present time, not in monkeys. The experience gained during the work performed in Malta during 1904-5 has convinced me that men are more susceptible to infection than monkeys and goats. Shaw's work on ambulatory cases of Mediterranean fever amongst the Maltese has also shown that opportunities for the creation of infected dust are plentiful in Malta. Infected dry dust as a cause of Mediterranean fever cannot therefore be discarded. When infection is acquired in this manner the incubation period is probably at least a month.

(4) Mediterranean fever can be acquired by the absorption of infected goats' milk from the alimentary canal. The incubation period in this case is also probably long, and may even extend to two months. This mode of infection probably plays a great part in the causation of Mediterranean fever amongst the Maltese, who drink raw milk drawn at the doors of their houses.

(5) *C. pipiens* and *S. fasciata* act as carriers of the *M. melitensis*, and the case of Carlo Mifsud renders it extremely probable that human beings are infected by the bites of infected mosquitoes.

(6) I believe that infected goats and infected mosquitoes play a greater part in the causation of Mediterranean fever than the absorption of infected dust.

Preventive Measures.

If the conclusions drawn as to the mode of entrance of the *M. melitensis* into the human body be accepted, preventive measures should obviously be based on the following lines :—

(1) *Destruction of Infected Goats in Malta.*—The best indication

of infection appears to be the milk agglutination test suggested by Zammit; unfortunately the test requires to be performed by a worker of considerable experience, and, judging by my own work, I think the hanging drop is preferable to the capillary tube employed by Zammit. The serum test is easier to perform, and as the experimental work has shown that goats may have a marked blood reaction, and that the *M. melitensis* may be present in the blood without the specific microbe necessarily appearing in the milk, all goats showing a decided serum reaction (dilution 1—20) should be destroyed. Examination of the milk alone cannot be taken as a basis of action in relation to goats, as we know that the excretion of the *M. melitensis* in the milk may be intermittent, and goats may be infected for some two to three months before the *M. melitensis* appears in the milk. As goats may become infected by eating rubbish polluted with urine in the streets of Malta, and they themselves, when infected, excrete the *M. melitensis* in the urine, so, adding to the contamination of the public thoroughfares, it is plain that the perambulation of goats through the streets of Malta should be forbidden. The goats should either be milked in their pens, and the milk transmitted to the chief towns in sealed cans, or the goats should be assembled in some central depôt outside the towns, and the yard of the depôt should have a cemented surface, which can be thoroughly cleansed after the milking operations are over. As there is a strong probability that infection is also carried from infected human beings to goats by mosquitoes, the keeping of goats in houses, and in small yards attached to houses, should be forbidden. Goats should be kept in pens as far away from human habitations as circumstances will allow.

(2) *Destruction of the Larvæ of Mosquitoes.*—This is a large order in a place like Malta; but it must be attempted if the disease is to be stamped out. By means of pamphlets, householders should be instructed to apply oil to the surface of all stagnant water on their premises. About 15 cc. of oil are sufficient for a square metre of surface; the application should be repeated every fifteen days in the hot weather. The oiling of stagnant water in the houses of the poor should be performed by the sanitary authority.

(3) Promiscuous micturition about the streets should be forbidden, and a heavy penalty inflicted on any offender. By means of leaflets, the people should be educated to understand the importance of preserving some degree of sanitation in their dwellings, especially in relation to cleansing and flushing water-closets.

Second-class water for flushing purposes should not be made a means of revenue, but should be supplied at cost price.

EXAMINATION OF ANIMALS IN CONNECTION WITH MEDITERRANEAN FEVER.

By Captain J. CRAWFORD KENNEDY.
Royal Army Medical Corps; Member of the Mediterranean Fever Commission

I.—The Examination of Dogs.

A series of 114 stray dogs, which had been seized by the police in the streets or in the suburbs of Valletta, Floriana, and Sliema, were examined. The animals were kept for twenty-four hours, in case they should be claimed by possible owners, and were then destroyed. Preparatory to their destruction I examined their blood for an agglutinative reaction to the *M. melitensis*, and if a positive reaction were obtained, I made a *post-mortem* examination. The agglutinative reaction was tried in dilutions of 1—10 and 1—30, with a time limit of half an hour. No sample was found to agglutinate beyond 1—30, unless it had stood for two hours. The result was a positive reaction in fifteen cases out of the total of 114, being a percentage of 13·15.

The following table gives at a glance the degree of reaction obtained. Each dog is described by a number, which is placed in the column corresponding to the degree of the serum reaction.

	Reaction incomplete, 1-10	Reaction complete, 1-10	Reaction complete, 1-30
Dogs by numbers ..	16	3	35
	23	11	44
	47 (No *post mortem*)	73	107
	76	90	
	83	101	
	111	103	
Total	6	6	3 = 15

The degree of reaction is, in no instance, high, and but for the result of the *post-mortem* examination might very well be ignored.

Of the fifteen dogs noted in the table, fourteen were examined *post mortem*. The routine adopted was to make cultivations on Petri dishes from the following organs: the spleen, the liver, the mesenteric, femoral and axillary glands, and the urine; broth cultures were also made from the heart's blood.

The result was that the *M. melitensis* was recovered in only one instance; this was from No. 44, whose blood reacted up to 1—30 dilution, but did not go further. No. 44 was a dark brown, short-haired bitch of Maltese breed, well advanced in pregnancy. Cultures on plates were made from the spleen, the liver, the mesenteric and femoral glands, and the urine. *M. melitensis* was recovered only from two plates made from the mesenteric glands. All the other organs were sterile and contained no Micrococcus. The spleen was most carefully examined—practically the whole of the organ was cut into thin slices and smeared on six large Petri dishes. The two plates made from the mesenteric glands contained respectively one and thirty-four colonies of *M. melitensis*.[1]

Summary.—None of the 114 dogs had the disease in an acute form. One dog contained *M. melitensis* in its mesenteric glands. At least nine (omitting the six with an incomplete reaction) showed unmistakable signs of infection—a percentage of eight.

Conclusions.—Sufficient proof is here presented that dogs become infected by the microbe of Mediterranean fever. Although I have not happened to come across one with the disease in an acute form, and have not been able so far to demonstrate the presence of the *M. melitensis* in the excretions, still there is no reason to suppose that infected dogs do not excrete the microbe in their urine as do other infected animals. The importance of this source as another cause of infection will be readily recognised, and in this connection it is interesting to note that 3,410 stray dogs were seized and destroyed by the police during last year in Malta alone.[2]

I am informed by Mr. Curmi, the Superintendent of Police, that the total number of dogs in Malta and Gozo is at least 40,000.

II.—Preliminary Note on Mules and Maltese Stable Employees.

With the kind permission of Colonel Winter, Director of Supplies and Transport, I was enabled to examine the blood of eighty-seven mules belonging to Government and used for transport purposes. The animals are not Maltese bred and have been in Malta for periods varying from six months to ten years. They are groomed and driven by Maltese carters, and all the stable-hands are Maltese. Those which I examined were quartered in three

[1] Though it may be merely a coincidence that *M. melitensis* was recovered only from the mesenteric glands, it suggests that the infection had entered by way of the alimentary tract.

[2] *Police Report, Malta*, 1904-5.

different stables: St. James's Ditch, Valletta; San Marco, Valletta; St. Paul's, Cottonera.

St. James's Ditch Stables are the more modern and more sanitary buildings, well ventilated and airy, and are situated just outside the walls of Valletta. San Marco Stables, standing in a low and thickly populated part of the town, are poorly ventilated, shut in on all sides, and damp. St. Paul's Stables are situated on the high ramparts of St. John's Bastion, in Cottonera lines. They overlook a slope thick with prickly pear; there is also a deep well just outside. The place is said to be infested with mosquitoes in the summer-time.

I am informed that with the exception of some influenza and simple fever very little sickness occurs amongst the mules. In appearance the animals are sleek and in good condition.

TABLE A.

Service in Malta	Quartered in Stables at			Total number examined
	St. James's Ditch	San Marco	Cottonera	
Under 1 year	6	—	—	6
1— 2 years	9	28	—	37
2— 3 "	2	—	1	3
3— 4 "	1	—	1	2
4— 5 "	1	—	1	2
5— 6 "	3	—	4	7
6— 7 "	9	1	6	16
7— 8 "	3	—	4	7
8— 9 "	1	—	3	4
9—10 "	2	—	1	3
Total	37	29	21	87

On my first visit to the stables one of the mules which I examined (No. 42,290) gave a negative serum reaction. On my second visit twelve days afterwards I was informed that this animal was on the sick list with slight fever, and had been "off duty" for a few days, but was returning to work next day. I therefore examined its blood again, and obtained a complete agglutination of *M. melitensis* in a dilution of 1—10; it did not, however, agglutinate in 1—20. This mule was undoubtedly suffering from a slight attack of Mediterranean fever. I have now (two months later) examined its blood again, and find that it reacts completely in 1—10 and incompletely in 1—20 in half an hour. In the absence of any other means of proving the presence of the disease among these mules this was a very opportune case.

The table (A) gives the number of mules examined according to their service in Malta, and the stables in which they were quartered:—

Each sample of blood was examined in dilutions of 1—10 to 1—50, with a time limit of half an hour. A reaction was obtained in thirty-nine cases, or 44·8 per cent., and the following table (B) gives these worked out to their highest dilutions:—

TABLE B.

Dilutions	1—10	1—20		1—30		1—40	Total
		In-complete	Complete	In-complete	Complete	In-complete	
Number of mules which reacted	23	6	6	2	—	2	39

I was enabled, through the courtesy of Mr. Macfarlane, M.R.C.V.S., to make *post-mortem* examinations of three mules which had to be destroyed on account of age and unfitness. I had previously examined samples of their blood, and found that one (No. 43,013) reacted in dilution 1—20, another incompletely in 1—10, and the third not at all. Cultures were made from the spleen, the mesenteric and femoral glands, and also, in the case of No. 43,013, from the liver. In every case these organs contained no *M. melitensis*.

To assist in arriving at some conclusions from these observations I drew up the facts in tabular form as follows:—

TABLE C.—NUMBER OF INFECTED MULES BY SERVICE IN MALTA.

	Under 1 year	1—2 years	2—3 years	3—4 years	4—5 years	5—6 years	6—7 years	7—8 years	8—9 years	9—10 years	Total
Number of mules examined	6	37	3	2	2	7	16	7	4	3	87
Number which reacted	1	21	2	1	1	4	5	3	1	0	39

TABLE D.—NUMBER OF INFECTED MULES ACCORDING TO STABLES.

	St. James's Ditch	San Marco	Cottonera	Total
Number of mules examined	37	29	21	87
Number which reacted	10	15	14	39
Percentage ..	27	51·7	66·6	

TABLE E.—NUMBER OF INFECTED MULES OF LESS THAN TWO YEARS' SERVICE, ACCORDING TO THEIR STABLES.

Mules under 2 years' service	St. James's Ditch	San Marco	Cottonera	Total
Number examined ..	15	28	—	43
Number which reacted	7	15	—	22
Percentage ..	46·6	53·5	—	51·1

A study of these tables suggests the following observations:—

(1) Mules of less than two years' service show a slightly larger proportion of infected cases than those of more than two years' service. This difference becomes much more marked as the reactions in the lower dilutions are eliminated, as shown in the next table (F). For the purposes of this comparison it is convenient that half the total number examined were under, and the other half over, two years' service.

TABLE F.

Number of mules	Service in Malta		Total
	Under 2 years	Over 2 years	
Examined	43	44	87
Reacted in 1—10 ..	22	17	39
" " 1—20 ..	7	3	10
" " 1—30 ..	4	—	4

It will be seen that none of more than two years' service reached the 1—30 dilution, while only three out of a total of ten reached 1—20. This points to a more severe or more recent infection among the later arrivals in the island.

(2) The stables at San Marco and at Cottonera show a larger proportion of infected animals than those in the Ditch. This, in the case of San Marco, is, I think, more apparent than real, for this reason, that most of the mules of less than two years' service are quartered there. When the two stables (San Marco and the Ditch) are compared by mules of the same length of service, the difference almost disappears. At the Ditch there were 7 infected out of 15 examined = 46·6 per cent. At San Marco 15 out of 28 = 53·5 per cent. At Cottonera all the mules are of more than two years' service, and comparing them with those of the same service at the Ditch, we find that the larger proportion of infected

cases at Cottonera is undoubted. At the Ditch there were 3 infected out of 22 examined = 13·6 per cent.; and at Cottonera 14 out of 21 = 66·6 per cent. There are, therefore, in proportion four times more infected mules in Cottonera than in the Ditch or in San Marco.

Summary.—Blood serum reaction to *M. melitensis* was obtained in 44·8 per cent. of mules examined. In one case the appearance of the serum reaction was coincident with a slight attack of fever. The serum reaction obtained was in every case rather low, only two reaching 1—40.[1] The highest reactions were obtained in those of under two years' service in Malta. In proportion there were four times more infected mules in Cottonera than in the Valletta stables.

Conclusions.—Mules are exposed to and suffer in a mild way from infection by *M. melitensis.* I reserve other remarks until further investigation has been carried out.

The Maltese Stable Employees.

The examination of those employed in the stables was a natural sequel to the examination of the mules. They are all Maltese, who have been employed with the Army Service Corps for periods varying between twenty months and twenty years; a good many new hands were taken on twenty months ago, and of these I examined thirty-three. The total number examined was eighty. I have divided them into two classes according to their employment.

(1) *Carters.*—These men drive the mules and spend most of their day on the road. They also groom their mules and spend one night in eight or nine on stable guard, when they remain on duty in the stables all night. On other nights they sleep at their respective homes.

(2) *Stable-keepers or Labourers.*—These men are the sweepers and general labourers in the stables; they spend practically the whole day in and about the stables, and on one night in every three they sleep there.

The result of the examination of the blood of these men for a reaction to *M. melitensis* was as follows:—

(1) *Carters.*—The total number examined was seventy-three, and of these thirty had been only twenty months in the service. Four

[1] To compare low serum reaction in animals, *vide* Report on Malta Fever in Dogs, *ante* p. 500.

gave a reaction; two in 1—30 and two in 1—10 dilutions. Their particulars are as follows:—

No. 80.—Reacted 1—30; thirteen years employed; says that he had fever lasting two months three years ago, and that he is in good health now. Temperature when examined, 99·6° F.

No. 121.—Reacted 1—30; twenty months employed; was sick with fever and pains in head four months ago.

No. 112.—Reacted 1—10; twenty months employed; had fever lasting eighteen days four years ago; is in good health now.

No. 114.—Reacted 1—10; fourteen months employed at Cottonera; says that he has never been sick except for pains in the head during the summer. Temperature normal.

Besides these cases, faint reactions were obtained in three others who had a history of fever many years ago; they were all old hands.

Nos. 80 and 121 are the only ones out of the above four that can definitely be said to have contracted fever whilst employed in the Army Service Corps stables; and No. 121 is the only one out of thirty with twenty months' service who has taken the disease.

(2) *Stable-keepers.*—The total number examined was seven, and of these three had twenty months' service. Two reacted. Their particulars are:—

S. A.—Reacted in 1—30; twenty months employed; fell sick at San Marco Stables in the beginning of the summer and was ill for four months.

S. V.—Reacted in 1—10; six years employed; had fever some years ago.

Both these stablemen contracted the disease whilst employed in the stables, and S. A. is one of three who have only twenty months' service.

Summary.—Of a total of eighty men examined, four (= 5 per cent.) showed signs of a more or less recent infection and had contracted the disease whilst employed in the stables. Two were stablemen and two were carters, being 28 per cent. of stablemen as compared with 2·5 per cent. of carters. Two out of thirty-three, or 6 per cent., contracted the disease within twenty months of starting work at the stables, one of whom was a stable-keeper, being one in three stablemen as compared with one in thirty carters.

Conclusions.—These observations are suggestive of lines for future work, especially with regard to biting insects.

(*To be continued.*)

HINTS REGARDING THE MANAGEMENT AND USE OF X-RAY APPARATUS.

By Lieutenant and Quartermaster F. BRUCE.
Royal Army Medical Corps.

(*Continued from page* 407.)

Induction Coil.

When we learn that a pressure of 50,000 volts is necessary in order to spark across one inch of air, it is obvious that the voltage obtained from a set of accumulator cells is useless for the purpose of exciting a vacuum tube in which the terminals are a few inches apart. By the aid, however, of the induction coil, the voltage is raised to suit our requirements. This instrument consists of the following parts, and as it is necessary that they should be well understood, they are described at some length.

(1) *Core.*—Composed of a bundle of very soft iron wire, the pieces being the same length as the finished coil. The core is immersed in melted paraffin wax, and afterwards wrapped from end to end with a layer of paraffined tape. When the coil is acting the magnetisation of the core furnishes the magnetic field to produce the phenomenon of induction in the secondary coil.

(2) *Primary Coil.*—This is formed by three layers of insulated copper wire, No. 12 B.W.G., wound round the core, and the whole immersed in melted paraffin wax. The ends of the wire forming the coil are continued through the interrupter, to the terminals marked "Battery" on the baseboard. The object of the primary coil is to magnetise the core when the current is passing.

(3) *Insulating Tube.*—Made of ebonite, and contains the primary coil and core. Its object is to separate the primary from the secondary coil between which there is a great tendency to spark.

(4) *Secondary Coil.*—Over the insulating tube on the primary coil is wound in layers and sections several miles of No. 36 silk-covered copper wire embedded in wax. This forms the secondary coil. When the magnetic field is formed by the magnetisation of the core, an induced current is produced in the secondary coil of very high electro-motive force.

(5) *Condenser.*—The condenser consists of a number of layers of thin tin-foil, insulated by layers of paraffined papers, alternate layers of the tin-foil being connected together, thus forming really two large sheets of foil, one of which is connected to the pillar

holding the contact spring of the contact-breaker, and the other to the pillar carrying the contact screw. The condenser is thus a bridge across the "make" and "break." It therefore destroys the detrimental self-induction of the primary coil, allowing the primary current to rise and fall at once, to and from its full strength. The self-induction of the primary circuit being reduced to a low point, the sparking of the contact-breaker is therefore at a minimum. It is placed in the base of the coil.

(6) *Discharging Pillars.*—These are generally placed on the top or baseboard of the coil, and are made of ebonite. Through their centres are conducted the ends of the secondary coil. These ends are secured to the brasswork fittings on the tops of the pillars. To these fittings provision is made for attaching the wires leading to the tube. There are also arranged on the brasswork fittings sliding holders, in which brass rods are fitted having ebonite handles, so that they can be manipulated with safety. The power of a coil is found by approximating or separating the points of the rod between the pillars, and the distance from point to point over which a spark can pass determines the capacity of the coil. The resistance of a tube is gauged by the alternative spark between these points.

(7) *Terminals.*—These are for attaching the wires from the battery and a mercury interrupter, and are so marked.

(8) *Commutator.*—By means of this appliance, which is fitted on the baseboard, the direction of the current can be changed as well as cut off.

Interrupters.—The phenomenon of induction in the secondary coil is only produced at the moment when the circuit in the primary coil is closed or opened. In order that the spark given off by the coil may be rich and powerful, it is not only important that the interruption of the current in the primary circuit should be of great frequency, but it is also as important to be able to so adjust the action of closing the circuit that its effect on the core, by magnetic saturation, will be to create an intense magnetic field round the secondary coil. The object of an interrupter is to effect that end.

There are three kinds of interrupters, viz., the platinum, the mercury, and the electrolytic. As their mode of action differs very considerably, separate descriptions are necessary so that the advantages and disadvantages incidental to each might be compared.

Platinum Interrupter.—This interrupter is actuated in two ways. Firstly, by taking advantage of the magnetic properties

in the core, and secondly, by an electric magnet when it is constructed separate from the coil, as in Apps' portable apparatus. The principle, however, is the same in both.

Before proceeding further, it is necessary to understand that the term "make" refers to the magnetisation of the core, and the "break" when the current is interrupted.

The action of a platinum interrupter can be best understood by referring to fig. 1. At the "make" the current entering from the positive pole of the battery ascends the brass pillar (7), passes through the platinum points (2), down the spring (6), and then on to primary coil, where, on passing, it magnetises the core and attracts the soft iron hammer (1). The hammer on being pulled away from its normal position separates the platinum points breaking the circuit as there is now no direct path for the current to flow. The current having ceased at the separation of the platinum points to pass through the primary coil, the soft iron core immediately becomes demagnetised and releases the hammer, bringing the points together, when the "make" is again made, and so the "makes" and "breaks" succeed each other automatically until the current battery is cut off by the commutator. As an inverse current is produced at the "make" and direct at the "break," it is obvious that the current in the secondary circuit is alternating. The impulse, however, of the direct current being much more powerful than that of the indirect, the effect produced by the latter is almost imperceptible.

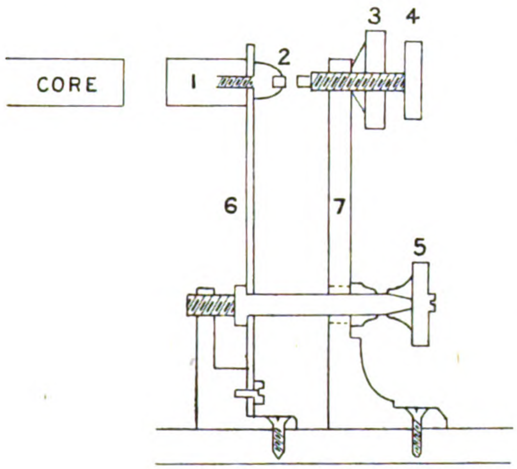


FIG. 1.

In adjusting a platinum interrupter, the following instructions should be carefully carried out, viz.: (*a*) Turn the tension screw (5) to the right until the spring (6) swings freely. (*b*) Loosen the lock nut (3). (*c*) Adjust contact screw (4) by turning it and pushing the hammer (1) until a distance of $\frac{1}{32}$ of an inch separates

it from the core of the coil. (*d*) Hold the contact screw (4) with one hand and screw the lock nut (3) tightly home against the pillar. (*e*) Turn the tension screw (5) to the left until the back nut engages the spring (6). (*f*) Allow the current to pass by turning over the commutator. (*g*) Turn the tension screw (5) to the left gradually, when, on the platinum points being pressed together, sparks will pass between the points of the discharging rods. (*h*) If an ammeter is placed in circuit it will be observed that the tightening of the tension screw increases the amount of ampères flowing into the coil. (*i*) As the platinum points are very liable to stick together the operator should stand beside the coil in readiness to turn off the current in the event of the points fusing. (*j*) Occasionally the points need filing, and this must be done by a very fine file. (*k*) Loosen the tension screw after each operation in order to save the spring. (*l*) By arranging an adjustable spark-gap in the secondary circuit the liability of the points to fuse is greatly minimised.

This type of interrupter, although still supplied by makers on most of their coils, is now very seldom used, as in comparison with the newer types it signally fails to produce the maximum effect of a coil.

Mr. Cox has lately introduced an improved form of platinum interrupter, having distinct advantages over the one just described. With a 12-volt current it gives more excellent results than can be obtained by the old pattern with 18 volts. In addition, the waste in platinum is not nearly so great, and the adjustments, when once arrived at, need practically no further attention. For field service work it will be much appreciated on account of the small voltage required. This is a great consideration, as batteries are difficult to maintain on active service, and any improvement which will reduce the numbers required will be welcomed by the X-ray operators. As this form of interrupter is likely to be extensively used in the future, a full description of its adjustment will not be out of place. On reference to fig. 2 it will be seen that there are four screws provided to adjust the action, viz., 1, 2, 3 and 4. The amount of play between the platinum points is regulated by the contact screw (2). The more this screw is withdrawn the larger will be the gap between the platinum points at the same time when the inner point is drawn back through the armature (5) being attracted to the core.

When working with 12 volts on the coil push the armature (5) as far back as possible and so separate the platinum points. Then

adjust the contact screw (2) so that the points are one-tenth of an inch apart and fix by tightening the locking screw (6).

If working with 6 volts this distance must be slightly decreased. By increasing the voltage the distance between the points must also be increased to prevent arcing.

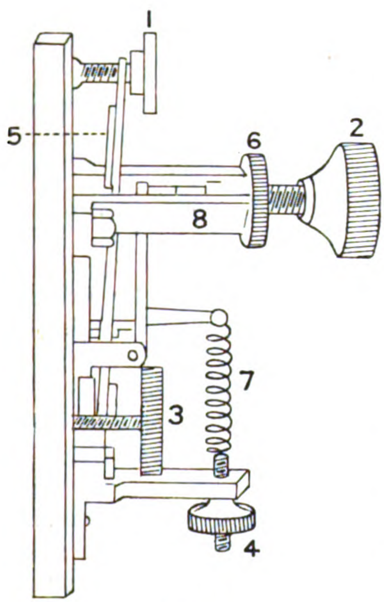


Fig. 2.

For lower voltages the swing of the armature (5) should be as large as possible. This swing is regulated by the screw (1). As the voltage increases the swing of the armature should be decreased. When working with 12 volts the swing should be about half an inch. It may be mentioned that the swing of the armature, to some extent, affects the amount of amperage passing into the coil. The amperage is also regulated by increasing or decreasing the tension of the spiral spring (7) by means of the screw (4) and by tightening screw (3).

When the swing of the armature and the tension of the contacts are properly adjusted there should practically be no sparking at the platinum points, and the coil should give its full-length continuous spark even with 6 volts.

If at any time it is desired to replace or file the platinum points, the piece (8) which carries the contact screw (2) can be removed by unscrewing the two hexagon nuts.

(*To be continued.*)

NOTE ON AN INVESTIGATION INTO THE BLOOD IN CASES OF TUBERCULAR DISEASE AND MALTA FEVER.

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The following series of experiments on the blood of tubercular and Malta fever patients have been carried out at Netley with a view to investigate—

(1) The claim made by Wright and Douglas, that the opsonic power of the blood in tubercular disease and Malta fever is lowered with regard to their respective causative bacteria.

(2) Whether such lowering of the opsonic power of the blood was specific to these diseases.

(3) Whether there was any close relation between the opsonic, phagocytic, and agglutinative powers of the blood with reference to the *Micrococcus melitensis* of Bruce, in cases of Malta fever.

(4) Whether, and if so at what ratio, the opsonic power of the blood decreased twenty-four hours after being drawn from the body.

The paper is divided into two parts: The first deals with the investigation into the opsonic power of the blood, with reference to the tubercle bacillus in cases of tubercular disease, as compared with that of patients suffering from diseases other than tubercle. The second part of the paper treats of a similar investigation into the blood in Malta fever, as well as a comparison between the opsonic, phagocytic, and agglutinative powers of the blood in that disease. There is also included in the second part of the paper an investigation into the blood opsonic power of patients suffering from diseases other than Malta fever on the *M. melitensis;* and the question of the loss of opsonic power in blood drawn from the body and kept *in vitro* for twenty-four hours is also dealt with.

The papers consist of a series of answers to questions on the four points mentioned as investigated.

Part I.

The Opsonic Power of the Blood on the Tubercle Bacillus in Cases of Tubercle, as Compared with that of Healthy Adults and of Patients Suffering from Diseases other than Tubercle.

The blood of eighteen patients suffering from tubercular disease was first examined. The methods adopted for estimating the opsonic power of the blood were similar to those first elaborated by Leishman and subsequently modified by Wright and Douglas.

The object aimed at was to estimate the power possessed by the blood serum of so preparing bacteria that they are more readily ingested by the leucocytes of the blood. The modification by Wright and Douglas of Leishman's original method of estimating phagocytosis consists in working with serum and leucocytes from separate sources and thus estimating the value of the blood fluids alone, while Leishman estimated the value of the entire blood in his phagocytic method.

Method.—The following fluids, in the quantities specified below, were measured off in capillary pipettes:—

(1) Washed blood corpuscles (as prepared by Wright and Douglas' method, slightly modified [1]) .. .. 2 parts.
(2) Tubercle bacilli, heated to 100° C., to destroy their agglutinating power, dissolved in physiological salt solution containing 1 per cent. of soda citrate, and then thoroughly centrifugalised to remove clumps.. .. 1 part.
(3) The blood serum of either the patient to be examined, or of a healthy man as control (this was obtained in the usual way, *i.e.*, by centrifugalising a capsule containing blood till the serum was separated from the clot) 2 parts.

The quantities so taken were mixed on a glass slide and the mixture redrawn up into the pipette, which was now sealed and incubated at 37° C. for fifteen minutes. On completion of the incubation, smears or slides were made from the mixture and stained as follows: Half a minute in hot carbol fuchsin, one minute in a 3 per cent. solution of sulphuric acid, then washed, and the slide dropped for one minute into watery methylene blue.

The slides were then washed and examined. The results obtained by this method of staining were satisfactory and constant, the bright, red-stained tubercle bacilli being easily distinguished

[1] The modification consists in using a pipette in the preparation of the washed corpuscles instead of a capsule as advocated by Wright. Equal parts of a little finger blood and a 1 per cent. solution of sodium citrate are drawn up into a pipette with a chamber two or three inches long. The mixture of blood and citrate solution is now drawn up into the chamber of the pipette while the stem is broken off short and sealed. The chamber containing the citrate blood is centrifugalised, the supernatant citrated plasma drawn off with another pipette, and an excess of physiological salt solution added to and mixed with the layer of blood corpuscles remaining in the chamber. The pipette chamber containing the mixture of blood cells and salt solution is again centrifugalised, and when the blood cells have settled down the supernatant salt solution is pipetted off. This process is repeated, and after the second washing the blood cells are considered washed, *i.e.*, freed from plasma; the upper layers of the blood cells remaining in the chamber after this second washing and centrifugalisation—which consist largely of white blood corpuscles—are made use of in the experiment. They are called "washed blood corpuscles" by Wright and Douglas, and are so referred to throughout this paper.

and counted in the pale, blue-stained polynuclear white blood cells. The tubercle bacilli contained in from fifty to sixty polynuclear leucocytes were then counted and the average number of tubercle bacilli per cent. estimated.

Example—

Examination of Blood of Control.

(1) J. C. B. S.'s (healthy adult's) washed corpuscles .. .. 2 parts.
(2) J. (healthy adult's) blood serum .. .. 2 parts.
(3) Tubercle bacilli heated to 100° C., dissolved in a solution of physiological salt and 1 per cent. soda citrate and then centrifugalised .. .. 1 part.

The above amounts were measured off in a capillary pipette, mixed on a slide, and redrawn into the pipette, which was sealed and incubated at 37° C. for fifteen minutes. A smear on a slide from this incubated mixture and stained in the manner above described, showed the presence of 177 tubercle bacilli in the first sixty polynuclear white blood cells seen and examined, or an average of three bacilli per cell. This number (three) was taken as the control unit.

Examination of Blood of Tubercular Patient.

(1) J. C. B. S.'s (healthy adult's) washed corpuscles .. .. 2 parts.
(2) Blood serum of W. (case of tubercular hip-joint disease) .. .. .. 2 parts.
(3) Emulsion of tubercle bacilli prepared as described above .. .. .. 1 part.

These fluids were mixed, incubated, and stained in a manner identical with that of the control. They showed the presence of 102 tubercle bacilli in fifty-four polynuclear white blood cells, or an average of 1·9 bacilli per cell. The ratio of opsonic power of the tubercular patient's blood on the tubercle bacillus to that of the control was therefore $\frac{1 \cdot 9}{3 \cdot 0}$, or 0·6, and this figure represented the opsonic index of the tubercular patient's blood.

Working by these methods, the blood in eighteen cases suffering from tubercular disease, and in eight non-tubercular patients, was examined, and an endeavour made to ascertain whether the opsonic power of the blood on the tubercle bacillus was lowered in tubercular disease; and if so, whether this lowering was specific to the disease or due to general causes, such as the debility and anæmia consequent on chronic affections.

Question I.—Is the opsonic power of the blood of tubercular patients on the tubercle bacillus lower than normal?

With a view to answering this question, the following examination of the blood of eighteen tubercular patients was undertaken. The cases examined were not all proved, bacteriologically, to be tubercular; but well-marked clinical types of the disease were selected, and this method was adopted owing to the difficulties

which were met with, and will always be met with, in proving many undoubted tubercular surgical affections to be tubercular bacteriologically.

Results. Table I.

(*The opsonic index of the blood of the control is taken as* 1.)

(1)	H., case of tubercular disease of prostate (tubercular bacilli present in urine)	0·86
(2)	Same case two months later, when the tubercle bacilli had disappeared from the urine	1·1
(3)	S., case of tubercular disease of testicle	0·63
(4)	M., case of tubercular disease of testicle	0·83
(5)	H., case of tubercular glands in neck	0·39
(6)	B., case of tubercular disease of hip-joint	0·8
(7)	A., case of tubercular testicle	0·7
(8)	Br., case of tubercular caries and necrosis of bone	0·77
(9)	W., case of tubercular testes..	0·7
(10)	H., case of tubercular disease of hip-joint	1·0
(11)	H., case of psoas abscess (some days after being scraped out)	1·3
(12)	R., case of tubercular testes..	1·0
(13)	W., case of tubercular disease of hip-joint	0·6
(14)	M., case of tubercular glands in neck	1·0
(15)	Case of phthisis (tubercle bacilli present in sputum)	0·73
(16)	,, ,, ,, ,, ...	0·84
(17)	,, ,, ,, ,, ...	0·85
(18)	,, ,, ,, ,, ...	0·7

In the above eighteen examinations it will be observed that the opsonic index of the blood was below normal in thirteen cases, normal in three, and above normal in two. Of the last two cases, one (H.), Case 2, had ceased to pass tubercle bacilli in the urine (as proved by inoculation into a guinea-pig) when this result was obtained, whereas, when a tubercle bacilluria had been present the opsonic index was below normal (see Cases 1 and 2). The second of the two tubercular cases with an opsonic index above normal was suffering from a psoas abscess which had been scraped out and flushed, and the man was convalescent when his blood was examined. This second case is interesting from the point of view of the claim made by Wright and Douglas, that the opsonins of the fluids in contact with the tubercle bacilli (pus from tubercular abscesses, peritoneal lymph from cases of tubercular peritonitis) become exhausted and cannot deal effectively with the bacteria, the improvement in the patient's condition, after the opening up of an abscess or tubercular abdomen, being partly due to the inflow of fresh opsonins in blood and lymph to replace the evacuated fluids.

Answer to Question I.—There appears to be, as is claimed by Wright and Douglas, a definite lowering of the opsonic power of the blood on the tubercle bacillus in tubercular diseases.

As the lowering of the opsonic power of the blood on the

tubercle bacillus found in the great majority of the tubercular patients might conceivably be due to the depressed body vitality, anæmia, and debility, consequent to a chronic disease like tubercle, another investigation was undertaken to decide this point.

Question II.—Is the lowered opsonic power of the blood on the tubercle bacillus, found in cases of tubercle, due to the debility and lowered vitality occasioned by a chronic disease, or is it specific?

To answer this question, the blood of seven patients in the hospital, debilitated by chronic disease other than tubercle, was examined.

Results. Table II.

(*The opsonic index of the control is taken as* 1.)

(1) F., case of debility after Malta fever. Opsonic index	1·0
(2) S., ,, ,, ,, ,, ...	1·0
(3) H., ,, ,, ,, ,, ...	1·0
(4) D., case of mitral disease and dropsy. Opsonic index	1·57
(5) C., case of severe secondary syphilis. Opsonic index	1·3
(6) T., case of extreme debility caused by severe tertiary syphilis. Opsonic index	0·76
(7) H., case of liver abscess. Opsonic index	1·0

It will be seen on examining these results that six out of the seven patients examined had a blood opsonic index which was normal, or above normal, while only in one case (6), where the debility was extreme, was the opsonic index below normal. Why two of these debilitated cases should have had a higher blood opsonic power on the tubercle bacillus than that of a healthy adult control I do not know.

Answer to Question II.—The lowered opsonic power of the blood on the tubercle bacillus present in tubercular disease appears to be specific to that disease, and is not due to the debility and depressed vitality consequent on a chronic malady like tubercle.

Part II.

An Investigation into the Opsonic Power of the Blood on the *Micrococcus melitensis* in Cases of Malta Fever, and in Cases of Debility due to other Causes, along with a Comparison between the Opsonic, Phagocytic, and Agglutinative Power of the Blood in Malta Fever.

An investigation on similar lines, and by methods similar to those used in estimating the opsonic index in tubercular disease, was carried out on thirteen cases of Malta fever, and on five patients debilitated by diseases other than Malta fever. The object aimed at was also the same, viz., to ascertain whether the opsonic power of the blood on the *M. melitensis* was definitely lowered in

cases of Malta fever, and, if so, whether this reduction in power was due to some specific cause, or, only to the debility occasioned by the disease. The only difference in the technique employed in this investigation from that used for the tubercular cases was, of course, the substitution of an emulsion of the *M. melitensis* for the emulsion of tubercle bacilli. This emulsion was prepared by adding a little distilled water to a recent growth of the *M. melitensis* on an agar slope. The growth was broken up in the water till a suitable emulsion had been formed; this was then drawn off into a glass capsule and heated to 100° C. for one hour to destroy the agglutinating power of the cocci. To three parts of the heated emulsion one part of a solution containing 3 per cent. of sodium chloride and a 4 per cent. of sodium citrate was added; the result being an emulsion of bacteria which contained 0·75 per cent. of salt and 1·0 per cent. of citrate of soda. Except for the method employed in staining the smears of incubated blood, the technique employed was similar to that described at length in the first part of the paper, and need not be mentioned again. After repeated trials the most satisfactory method of staining the films found was to dip an unfixed film of blood for a few seconds into weak watery gentian-violet. This method caused dehæmoglobinisation of the red cells and left the leucocytes stained faintly violet, the contained cocci being recognised by their slightly greater depth of stain.

The serum for the control was taken from W., and the washed corpuscles from J. C. B. S., both healthy adults.

Question III.—Is the opsonic power of the blood for the M. melitensis *lowered in Malta fever?*

With a view to answering this question the blood of thirteen patients in the hospital suffering from Malta fever was examined.

Results. Table III.

THIRTEEN CASES OF MALTA FEVER.

(*The opsonic index of the control is taken as* 1.)

(1)	P.	Opsonic index	0·75
(2)	T.	,,	0·8
(3)	S.	,,	0·9
(4)	Sh.	,,	0·83
(5)	H.	,,	0·35
(6)	F.	,,	0·92
(7)	Sa.	,,	0·95
(8)	P.	,,	0·39
(9)	G.	,,	0·56
(10)	W.	,,	0·77
(11)	P.	,,	0·78
(12)	Wo.	,,	0·7
(13)	P.	,,	0·7

It will be noticed that in all thirteen of these cases proved (by the ability of their blood in high dilution to agglutinate the *M. melitensis*) to be Malta fever, the opsonic power of the blood for the *M. melitensis* is below normal.

Answer to Question III.—The opsonic power of the blood on the M. melitensis *appears to be definitely lowered in cases of Malta fever.*

The next point to be investigated was, whether this lowering o the opsonic index was due to some specific cause or to debility only. Although this point had been decided where the tubercle bacillus was in question, when the lowering of the opsonic index in tubercular disease was found to be specific, it was thought advisable to investigate this point with regard to the *M. melitensis* also.

Question IV.—Is the lowered opsonic power of the blood in Malta fever on the M. melitensis *due to the debility and depressed body vitality following this debilitating disease, or is it specific?*

To settle this point the blood of five patients debilitated from diseases other than Malta fever was examined.

Results. Table IV.

(*The opsonic index of the control blood is taken as* 1.)

(1) Case of cirrhosis of the liver and ascites. Opsonic index	1·0
(2) Case of locomotor ataxy. Opsonic index	1·2
(3) Case of dysentery. Opsonic index	1·2
(4) Case of heart disease. Opsonic index	0·9
(5) Case of enteric fever. Opsonic index	1·1

In these five cases it will be noted that only one has an opsonic index for the *M. melitensis* lower than normal.

Answer to Question IV.—The lowered opsonic power of the blood on the M. melitensis *in cases of Malta fever is due to a specific cause and not to the debility, &c., consequent to that disease.*

The blood from the cases marked (9) to (13), inclusive, of Malta fever shown in Table III. was then examined with a view to comparing its opsonic, phagocytic, and agglutinating powers. The method adopted for estimating the phagocytic power of these cases was that of Leishman's, as slightly modified by Wright and Douglas, and consisted in drawing up equal parts of the blood of the control or of the Malta fever patient along with the emulsion of the *M. melitensis* (prepared as described above) into a capillary pipette. The equal parts of blood and emulsion were then treated in an exactly similar manner to that described in the first part of the

paper in estimating the opsonic power of the blood. That is to say, these equal parts of blood and emulsion of the *M. melitensis* were mixed on a slide and redrawn up into the pipette, which was sealed. The pipettes were now incubated at 37° C. for fifteen minutes. In default of a regular incubator, which could not be used, as the examination was conducted on bedridden patients in a ward, an improvised incubator was used. This incubator consisted of two glass beakers placed one within the other. The inner beaker and the space between the inner and outer beakers were filled with water at a temperature of 37° C. This temperature was readily maintained during the investigation by the occasional warming of the improvised incubator over a small lamp, or by adding a little hot water to the water in the beaker as occasion required.

The agglutinating power of the Malta fever blood was determined by the sedimentation test.

Question V.—Is there any close relation between the opsonic, phagocytic, and agglutinating powers of the blood in Malta fever?

Results. Table V.

OF THE BLOOD EXAMINED IN FIVE CASES OF MALTA FEVER AND ONE CONTROL.

Cases	Opsonic power	Phagocytic power	Agglutinating power. (Highest dilution with which positive result obtained)
Control blood ..	1·0	1·0	*Nil.*
(9) G.	0·56	0·5	1 in 800
(10) W.	0·77	0·58	1 in 600
(11) P.	0·78	0·52	1 in 600
(12) Wo.	0·7	0·63	1 in 800
(13) P.	0·7	0·79	1 in 300

The control used for testing the opsonic power of the blood in these five cases of Malta fever consisted of J. C. B. S.'s corpuscles along with W.'s serum. The opsonic indices of the patient's blood were obtained by using J. C. B. S.'s corpuscles along with the patient's blood sera, as the washed corpuscles used in both cases were from the same source, the difference between the opsonic index of any of the Malta fever patients and the control represented the difference between the opsonic power of normal serum and the serum of the Malta fever patients. In the estimation of the phagocytic power of the bloods, however, the control used was W.'s whole blood (*i.e.*, corpuscles + plasma), and the comparison obtained is between W.'s whole blood and the whole blood of the Malta fever patients. As the difference between the opsonic indices of control and Malta fever bloods has been shown to be due to the difference

between a normal and a Malta fever serum, and the difference between the phagocytic indices of the blood of its control and the Malta fever patients is necessarily due to a difference between both corpuscles and plasma,[1] the variation between the phagocytic and opsonic indices is a measure of the activity and vitality of the phagocytes themselves, apart from serum influences in each particular case. Thus in Cases 9, 10, 11 and 12 the phagocytic index being lower than the opsonic index shows the phagocytes of these four patients to be less active than those of W., the control, while those of Case 13 are more active, for here the phagocytic index is higher than the opsonic index. This table further shows that while there is an approximate correspondence between the opsonic and phagocytic powers of the blood, there is no definite relation between these properties and the agglutinating power.

Answer to Question V.—There is a more or less definite relation between the opsonic and phagocytic powers of the blood, the phagocytic index being generally lower than the opsonic index, owing to the leucocytes of the patient being less active than those of a healthy adult control, but the converse may be found. There appears to be no definite relation between the opsonic and phagocytic powers of the blood in Malta fever and its power of agglutinating the M. melitensis. *It appears that the simpler process of estimating the phagocytic power of the blood alone might be substituted for the longer and more difficult method of estimating the opsonic power when time or opportunity would not permit the latter process being carried out.*

Question VI.—What is the amount of the decrease of the opsonic power of blood drawn from the body and kept in vitro *for twenty-four hours?*

This experiment was carried out with a view to determine whether a sample of blood could be sent, say from an out-station to a district laboratory, in order to have its opsonic value tested.

The opsonic power of the blood on the *M. melitensis* was tested (*a*) when freshly drawn, and (*b*) when kept in a capsule for twenty-four hours. Three samples of blood were examined, one from W. (the control used in the Malta fever investigations), the second from a patient suffering from cirrhosis of the liver, and the third from a case of locomotor ataxy. The opsonic powers of these bloods were estimated in a manner identical with that described in the first test of the paper. The washed corpuscles used were in each case derived from J. C. B. S.

[1] Wright and Douglas have proved that blood plasma and blood serum have the same opsonic power.

Results. Table VI.

Case	Fresh blood	Twenty-four hours' old blood	Percentage of decrease of opsonic power
(1) W. (healthy adult's) serum + J. C. B. S.'s corpuscles; 30 cells counted	Average of 4 cocci in each cell	Average of 3 cocci in each cell	25
(2) Serum of case of cirrhosis of liver + J. C. B. S.'s washed corpuscles; 20 cells counted	Average of 5·4 cocci in each cell	Average of 3·8 cocci in each cell	28
(3) Serum of case of locomotor ataxy + J. C. B. S.'s washed corpuscles	Average of 4 cocci in each cell	Average of 3·5 cocci in each cell	13

It will be seen from these figures that though the decrease is not a constant one, yet there is a considerable decrease in the opsonic power of the blood if drawn and kept for twenty-four hours. Wright and Douglas have already shown that there is such a decrease, and estimate it at from a third to a half in the course of three days, while finding little variation after a few hours. The deterioration after twenty-four hours was estimated, as this period would about represent the time necessary for a sample of blood to be sent from an out-station for analysis.

Answer to Question VI.—There is so considerable and definite a loss of the opsonic power of the blood twenty-four hours after being drawn, that no reliable results could be obtained from an examination of such blood.

General Conclusions and Remarks.

The conclusions arrived at, after this long and somewhat tedious examination of over sixty samples of blood, need be but briefly recapitulated, as they have already been given in the answers to the questions upon the various points of investigation.

(1) The results of the investigation tend to confirm the claim made by Wright and Douglas that the opsonic power of the blood in cases of tubercular disease and Malta fever is lower than normal.

(2) This lowering of opsonic power appears to be specific to these diseases, and not due to general causes, such as the debility and depressed vitality following chronic affections.

(3) In view of these facts and the success attained by Wright and Douglas in the treatment of diseases due to the staphylococcus and tubercle bacillus, by raising the opsonic power of the blood by injections of small quantities of the killed bacteria causative of these

diseases, a similar method of treatment might, with advantage, be employed in Malta fever.

(4) That, while there is no apparent relation between the agglutinating power of the blood and its opsonic power, the opsonic and phagocytic values of the blood do not differ seriously.

(5) That, in view of the latter fact, of the simplicity of Leishman's phagocytic method, the somewhat complicated nature of the modification introduced by Wright and Douglas of using washed corpuscles, and finally of the loss in opsonic power of drawn blood, it would be generally advisable to use the phagocytic method. A sample could not usually with advantage be sent for examination of its opsonic power from an out-station to a district laboratory. It may be remarked that the method of testing the opsonic power of the blood serum apart from the corpuscles is neither an easy one nor does it give invariably satisfactory results. One cause for this is the difficulty in getting a satisfactory layer of white blood corpuscles. In an earlier part of the paper it was shown how in this method the blood serum of the patient was tested against the blood serum of a healthy man as control, an equal quantity of washed blood corpuscles and of the bacterial emulsion to be tested being added.

These washed corpuscles are derived from an independent and healthy source and are prepared by washing them with physiological salt solution, to get rid of the blood plasma, and by centrifugalising, to get a layer of white blood cells (which are lighter than the reds) to the surface. This layer of leucocytes is very small, and when one dips a pipette into it in order to take up the required quantity of washed corpuscles, one sometimes gets a considerable number of leucocytes ; or, if the pipette has been dipped in the least bit too far, very few. Thus, if a series, say two or three blood sera, are being tested with the same stock of washed corpuscles, the first sample may be tested with a large number of leucocytes and the last with very few. This, if it occurs, must not only introduce a source of inaccuracy, but also make it difficult to do a phagocytic count in the last sample owing to the paucity of leucocytes on the slides. The simple original method of Leishman's (as slightly modified by Wright and Douglas) has not this source of error and annoyance, as one whole blood is tested against another, though, of course, here also the leucocytes of one blood may be slightly greater than those of the other sample taken.

There is another source of difficulty in testing the opsonic power of the blood when emulsion of tubercle bacilli and the *M. melitensis*

are used. This difficulty, which is present in both the opsonic and phagocytic methods, is due to the fact that however well one may centrifugalise an emulsion, occasional small clumps of bacteria may be retained—the ingestion of even one or two clumps into phagocytes might prejudice the resulting count somewhat.

Another point which caused some trouble when dealing with emulsions of tubercle bacilli, was that there were appreciable numbers of what appeared to be branched forms; and it was occasionally difficult to decide whether this appearance was really due to branching, or to two or three bacteria joined at an angle; in short, whether these forms should be counted as one or more.

Another difficulty experienced was in doing the phagocytic counts on the Malta fever cases. In these experiments the minute *M. melitensis* was stained the same colour as its containing cell, and was very difficult to define and count accurately. Unfortunately, the difficulty will always occur, as differential staining, as in the case of the tubercle bacillus, is here impossible.

These difficulties in phagocytic counts, where the tubercle bacillus or the *M. melitensis* is concerned (there are few difficulties in phagocytic counts with the staphylococcus), render them liable to an appreciable margin of error. In fact, Lieutenant Proctor, I.M.S. (who helped me in some of the counts), and I endeavoured to find how great this error might be, by independent phagocytic counts from slides derived from the same sample of blood tested. We found frequent differences of as much as 10 per cent. between our respective counts, and the difference was occasionally much greater—15 to 20 per cent. As the opsonic indices of the bloods of some of the patients given in the tables in this paper are only 10 per cent. under normal, this source of error is a somewhat serious one, though I do not think it is sufficiently serious, or occurs often enough, to greatly diminish the value of Leishman's method of phagocytic counts, or the process as modified by Wright and Douglas for opsonic tests, in these cases.

In conclusion, I have to thank Dr. Wright for a supply of killed tubercle bacilli, and Lieutenants Proctor and White, I.M.S., for help in doing some of the phagocytic counts for me.

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TRYPANOSOMIASIS IN THE WEST AFRICAN REGIMENT, SIERRA LEONE.

By Captains H. W. GRATTAN and E. W. COCHRANE.
Royal Army Medical Corps.

HITHERTO, trypanosomiasis has not been regarded as a Sierra Leone disease. Cases have been imported from time to time from endemic areas, but we believe that we are now reporting trypanosomiasis for the first time in the West African Regiment, Sierra Leone. One of the cases is of special interest on account of his having spent all his life either in the Colony or Protectorate of Sierra Leone.

Manson, in describing sleeping sickness, says that Sierra Leone is one of the places in West Africa where the disease is said to be unknown. The Hon. W. T. Prout, C.M.G., Principal Medical Officer, Colonial Medical Service, Sierra Leone, who has been in the Colony for many years, says that although he has seen many cases of sleeping sickness in Sierra Leone, he cannot recollect one in which the patient had not come from one of the well-recognised endemic areas, and that he has never regarded the disease as endemic in Sierra Leone. Laveran and Mesnil describe the Hinterland of Sierra Leone as an endemic area. The Annual Reports of the Army make no reference to the existence of the disease amongst the troops in Sierra Leone or elsewhere.

In May, 1905, Captain J. V. Forrest, R.A.M.C., discovered a trypanosome in the blood of a private of the West African Regiment, and to this officer the credit is due of having first recognised the disease in a patient who has never been out of Sierra Leone. We take this opportunity of thanking Dr. J. L. Todd, of the Liverpool School of Tropical Medicine, for having demonstrated to us the value of gland palpation and puncture as a means of diagnosis.[1] It has proved to be the simplest and most certain method. By following this technique we were enabled to pick out fresh cases in the West African Regiment, and many others amongst the civil population.

The West African Regiment consists of one battalion, with

[1] [This useful means of diagnosis was first discovered and described by Captain Greig, I.M.S., and Lieutenant Gray, R.A.M.C., Sleeping Sickness Commission, *Proceedings of the Royal Society*, vol. lxxiii., page 455, 1904.—ED.]

about a thousand native rank and file, with European officers and Colour-Sergeants. Theoretically, there are four officers per company, but owing to the absence of at least one-third of the total number on leave, there are generally only from two to three officers per company, in times of peace. The strength of European Colour-Sergeants is eighteen, which allows for one per company, a Sergeant-Major, and those on leave. The regiment is recruited in Freetown, and until quite lately "recruiting agents" have not been sent out to the Protectorate, since the supply of good recruits has always exceeded the demand; recently, however, men have been sent out to a district to procure recruits from some particular tribe. The men enlisted are not, except in a few cases, natives of the Colony of Sierra Leone, but come from the Protectorate, having probably arrived in Freetown as carriers, or with the intention of joining the regiment.

The Colony of Sierra Leone consists for the greater part of a peninsula, and is about 30 miles in length, with an average breadth of 20 miles. The Protectorate, which is roughly rectangular in shape, is about 170 miles from east to west, and 200 miles from north to south; it is bounded on the north and east by French territory, and on the south by Liberia.

The chief tribes represented in the West African Regiment are: Timini, 33 per cent.; Mendi, 37 per cent.; Susu, 6 per cent.; Lokko, 5 per cent.; Joliffes, 3 per cent.; Creoles, 1·5 per cent.; other tribes in small numbers, 10·5 per cent. The Timini country extends from the Colony towards the northern part of the Protectorate, and the Mendis inhabit the part stretching towards the south-west. The Lokkos come from the central part of the Protectorate, and the Susu, Joliffe, and several other smaller tribes come from its borders. As the international boundary has not been fixed with any regard to the tribal divisions, a tribe may find itself situated partly in French and partly in British territory. This accounts for the fact that there are several men now serving in the Regiment who come from the French country, and cases have occurred of men enlisting who had previously served in the French Colonial Forces. The small number of "Creoles" (descendants of liberated slaves and inhabitants of Freetown and its vicinity) is accounted for by the fact that they are specially enlisted for the Band; any thus enlisted must be able to read and write.

An extract from the notes made by the medical officers who were in charge of Captain Forrest's case at different times might be of interest. The first notes are by Captain J. V. Forrest, who

was stationed at Mabanta, Sierra Leone Protectorate, in medical charge of the company of the West African Regiment to which the man belonged.

Case of Private Momo Yeto, West African Regiment.

"Mabanta, June 13th, 1905.—No. 2678 Private Momo Yeto, West African Regiment, reported sick on May 30th, 1905, about a week after his arrival from Freetown, complaining of 'fever.' His temperature was 101° F., and smears of his blood were taken and stained with Leishman's stain, but no malarial parasites could be found. On examination of fresh blood one trypanosome was discovered. This led to further examination of fresh blood specimens, and on most days actively motile trypanosomes were seen, and they were also found in stained preparations.

"The patient is a recruit of about nine months' service in the West African Regiment. He is of slight build, and his age is stated to be 22 years. In appearance he is dull and lethargic, and there is some puffiness of his eyelids. The clavicles are prominent, and his arms are wasted and tremulous. He says that he has got thinner of late. His tongue is flabby, furred, and deeply cracked around the edges. His Colour-Sergeant says that he is of no use on parade as he is 'all of a tremble,' and can hardly hold his rifle. Unfortunately, I have been unable to obtain any further information from his N.C.O.'s or comrades with regard to any changes which may have taken place in his character or disposition during the last few months, as he was transferred to his present company about a fortnight before coming under my notice. The superficial cervical glands are enlarged, those in the groin and axilla are normal in size. The spleen is not enlarged. There is a soft, blowing systolic murmur to be heard over the heart's apex. For four days after admission his temperature rose at night to 101° F., and then gradually dropped to normal. Since then there has been an occasional rise of temperature, the highest point reached being 100·2° F. Blood count: Red blood corpuscles, 4,200,000 per c.mm.; white blood corpuscles, 8,750 per c.mm. Stained films show marked increase of eosinophiles.

"*Personal history*, as far as obtainable: He belongs to the town of Yonni Banna, in the district of Ronietta, Sierra Leone Protectorate, about thirty miles from the railway station of Moyamba. The place is marked on the Ordnance map. He appears to have spent all his life in that neighbourhood until he went to enlist at

Wilberforce about nine months ago. He says that he has never been ill before. I am transferring him to Freetown for further observation and invaliding."

The man was sent from Mabanta to Port Lokko, on June 14th, 1905, on his way to Freetown, and was seen by one of us (E. W. C.) on the following day. He had been carried in a hammock the twenty-five miles between these two stations, as he was only able to walk short distances. He was dull and stupid in appearance, but answered questions intelligently, although his speech was slow. His blood was examined on both June 15th, 1905, and June 16th, 1905, but no trypanosomes were found. As he was sent on to Freetown on June 16th, 1905, there was no further opportunity for investigation at that time.

After his arrival at Wilberforce, on June 19th, 1905, the following notes were made by Captain E. W. Bliss, R.A.M.C. :—

June 19th, 1905.—This man arrived here to-day as a sick transfer from Mabanta. The patient stands in rather a listless manner; upper eyelids markedly dropsical. Tongue furred, cracked and deeply indented by the teeth, and very tremulous. Lower lips also tremulous, and fine tremors of hands and forearms are present. No tremors of lower limbs. Patient states that he has wasted, and this is corroborated by other opinions. He sleeps a good deal during the day, and does not rouse until after he has been spoken to for some moments. Nothing else of importance to be made out by examination.

June 26th, 1905.—The temperature has been of an intermittent character for last two days. Tongue cleaner. Tremors and other symptoms remain the same. Liq. arsenicalis, m. v., four times a day, has been given for three days. Blood count by one of us (H. W. G.) : Red blood corpuscles, 4,228,000 per c.mm.; white blood corpuscles, 11,160 per c.mm.; hæmoglobin, 60 per cent. (Gowers). Differential count (500 cells) : Polynuclears, 52 per cent.; lymphocytes, 33 per cent.; large mononuclears, 6 per cent.; eosinophiles, 9 per cent.

June 30th, 1905.—Patient seems more shaky and weaker this morning. Temperature is subnormal. Takes his food well and sleeps a good deal. After the arsenic, trypanosomes disappeared from the peripheral blood.

July 2nd, 1905.—He still seems very weak; is getting milk, beef tea and arrowroot as extras, and a mixture containing digitalis and strychnine. Pulse good. Complains of epigastric pain. Ankylostoma ova were found in stools.

July 4th, 1905.—Rather better. Thymol, gr. x., given every two hours for four doses. Tremor of tongue, hands and forearms unchanged.

July 5th, 1905.—Patient very weak this morning. Pulse small, weak, but regular. Rather drowsy. Complains less of abdominal pain. Takes nourishment indifferently.

July 10th, 1905.—Sleeps much during the day, and has to be roused to take food, but his appetite is fairly good. Is not quite so weak.

July 18th, 1905.—The only change since last note is that there is an increasing tendency to sleep. He takes all nourishment when roused. Tongue remains red, raw, cracked and deeply indented by the teeth. The tremors of the hands are not so marked.

July 20th, 1905.—No trypanosomes found in peripheral blood yesterday. Condition unchanged.

July 26th, 1905.—This morning a large number of trypanosomes are present in the blood; they are very actively motile. Tremors of hand and tongue less marked. Sleeps nearly all day. Cervical glands still enlarged. Gait staggering. Muscular weakness more marked.

August 3rd, 1905.—Yesterday no trypanosomes to be found in blood, and since then his condition has quite changed. He is brighter and much less sleepy; he walks and stands better. Temperature normal. Appetite good. Arsenic has been discontinued.

August 8th, 1905.—Since the afternoon of 5th inst. his temperature has been up again; is now 99·8 F. His condition is slightly changed, as he is more drowsy. Hands, lips and tongue more tremulous. Trypanosomes found in fresh blood specimens to-day. Blood count by one of us (H. W. G.): Red blood corpuscles, 3,796,000 per c.mm.; white blood corpuscles, 10,020 per c.mm.; hæmoglobin 67 per cent. (Gowers).

August 11th, 1905.—Chrysoidin, $\frac{1}{10}$ grain, hypodermically at 5 p.m. No trypanosomes to-day in blood from finger. No marked change since last note.

August 17th, 1905.—Injections of chrysoidin given daily since last note. Condition seems to be somewhat improved. Patient less sleepy and has talked to other men in his ward, which he had not previously done.

August 19th, 1905.—Injections have been continued and the improvement seems to be maintained. "Gland juice" taken yesterday, but no trypanosomes found in wet or stained specimens.

August 20th, 1905.—Dr. J. L. Todd saw the patient to-day and demonstrated the presence of trypanosomes in the cerebro-spinal fluid by lumbar puncture.

August 21st, 1905.—This morning patient got up and washed himself. His gait is very staggering; tongue cleaner and less tremulous.

August 28th, 1905.—Patient appears to be getting more drowsy again. The tremors are very well marked and the cervical glands are increasing in size. Case handed over to Captain Cochrane, R.A.M.C.

August 29th, 1905.—The following notes were made by one of us (H. W. G.): The submaxillary, submental and posterior sterno-mastoid glands are enlarged, also the axillary, inguinal and femoral; enlargement of the latter being most marked. The left epitrochlear gland is about the size of a hazel-nut. The skin is dry. There is slight tremor of both hands and the grasp is weak and enfeebled. There is a general wasting of the muscles, accompanied by muscular weakness. The tongue is tremulous. Tactile sensibility is reduced. Sensation to pain is diminished and delayed. Thermic sensation normal. The patellar reflex is present, but obtained with difficulty. No ankle-clonus. Abdominal reflex present, plantar absent. Cremasteric and conjunctival reflexes diminished, the latter markedly so, as he allows the finger to rest on the eyeball for a second or more before winking. Pupils equal, 3 mm., react sluggishly to light and accommodation. No nystagmus. Pallor of both discs noted. Ptosis present. Hearing normal. Voice low and monotonous. Is in a very low and depressed mental condition. Complains of pain below ensiform cartilage, a symptom of ankylostomiasis. Stools examined. Ova of *Ankylostomum duodenale* present. On examining a stool preparation with a $\frac{1}{6}$th objective the whole field was seen to shimmer with active movement; this was due to a number of flagellate bodies, which were swimming about in every direction.

August 30th, 1905.—The patient lies in bed apparently asleep, and presents the typical picture of a case of sleeping sickness. If called by name he merely answers with a grunt, but if told to open his mouth and put out his tongue will do so. He can be made to sit up in order to take food, but has to be fed. His body is wasted but not emaciated. Skin rough and dry. Heart and lungs normal; no cardiac bruit can now be detected. Pulse 90, fairly strong. Liver not enlarged. Spleen cannot be felt. Tongue moist, but cracked and furred. Urine normal. Tremors of tongue and arms

well marked. Pupils equal and moderately dilated; they react to light. General enlargement of superficial glands without any surrounding inflammation, but the largest to be felt is not more than $\frac{3}{4}$ inch by $\frac{1}{2}$ inch.

The injections of chrysoidin were stopped on August 30th, 1905, and arsenic by the mouth substituted. On September 11th, 1905, it was noted that he was gradually getting worse, as, in addition to becoming more comatose, he commenced to lose control of his sphincters and pass motions and urine under him. Up to this time he had always made his wants known.

No trypanosomes were found by blood examination on September 6th and 11th, 1905, although he had fever on both occasions.

On September 25th, 1905, his condition was little changed; 10 cc. of cerebro-spinal fluid were withdrawn by one of us (H. W. G.), and trypanosomes were found in it. They were also found by puncture of a cervical gland, but none were seen in the blood.

October 16th, 1905.—His temperature, which, up to this date, had varied between normal and 101·4° F., rose to 103·6° F. at 8 a.m. His pulse was 120 and weak. He had been constipated for some days, in spite of calomel and sulphate of magnesium, and was given a simple enema with fair result. During the day he commenced to hiccough, but this symptom disappeared at night. Evening temperature 103·4° F.; pulse 140, very weak and thready. His blood was examined in the morning with negative result.

October 17th, 1905.—Morning temperature 98·6° F.; pulse 120, stronger than yesterday. Hiccough still comes on at times. On the morning of October 18th, 1905, there was an apparent improvement in his condition, but after mid-day his temperature began to rise and at 4 p.m. was 105·6° F. His pulse became more rapid and weaker, and he died at 5.40 p.m.

Post-mortem Examination Fourteen Hours after Death.—Body considerably wasted. Skin rough and dry.

Brain.—Membranes normal. Weight, forty-eight ounces. Surface congested and small vessels markedly injected. About three ounces of cerebro-spinal fluid escaped whilst removing the brain. Cerebro-spinal fluid somewhat cloudy and of a pale straw colour. Pituitary body congested. Cribriform plate of ethmoid very thin and transparent, upper surface appeared more concave than normal. No pus in ethmoidal cells. White matter of brain slightly congested. Posterior cornua of lateral ventricles appeared to be dilated. Choroid plexus congested and about three times as large as normal.

Lungs.—Right weighed eighteen and three-quarter ounces; left

thirteen and a half ounces. Anterior margins of both were pale and emphysematous. Posteriorly, both were in a state of hypostatic congestion, which condition was more marked on the right side.

Heart.—Weight, eight and a quarter ounces. Pericardium, healthy. Large *ante-mortem* clot in right ventricle which obliterated more than half the cavity. Small *ante-mortem* clot in left ventricle. Valves healthy.

Liver.—Weight, forty-eight and a half ounces. Surface, mottled and substance firm. Organ congested and full of blood.

Spleen.—Weight, four and a half ounces. Shrunken and contracted. Capsule furrowed in many directions, tough and much thickened. Had evidently been considerably enlarged at some period.

Stomach.—Normal. No inflammation, no ulceration.

Intestines.—Abdominal contents normal in appearance, except that the omentum was very much wasted and contained little fat. No pathological condition discovered in intestinal tract, except that about a dozen adult *Ankylostoma duodenale* were found adhering to the mucous membrane of the duodenum and jejunum. Mesenteric glands slightly enlarged.

Kidneys. — Right weighed five and a half ounces; left, six ounces. Both markedly congested with adherent capsules.

Remarks.—The last date on which trypanosomes were seen in the blood was August 8th. They were numerous at 11.30 a.m. on that date. At 1.30 p.m. none were seen. The presence of a flagellate body in the stools is interesting. It is evident that the trypanosome was in the cerebro-spinal fluid when the case was first diagnosed. No filaria were seen in the patient's blood.

Animal Reactions.—Effect of the Injection of Blood from Private Momo Yeto into Guinea-pigs and White Rats.

Two guinea-pigs and two white rats were inoculated with blood from the finger of Private Momo Yeto on July 10th, 1905, when patient was suffering from typical sleeping sickness.

Sub-inoculations were made, the animals employed being guinea-pigs, tame white rats and monkeys. The virulence of the trypanosome was not increased by sub-inoculation into guinea-pigs. In white rats the virulence was increased, the incubation period being shortened from seventy-three days to four and six days. The disease caused a progressive anæmia in these animals. Their pink eyes became a pale glassy tint. Their ears and feet became dead

white. They developed a watery conjunctivitis, which passed on into panophthalmitis in two cases.

Rats Nos. 4 and 5 were brought to England. The cold undoubtedly hastened the death of rat No. 4. The panophthalmitis may have been due to injury on the voyage home. Three rats were brought home in one cage, one infected with *T. lewisi* and the other two with *T. gambiense.* Both the *T. gambiense* rats developed panophthalmitis of one eye. The eyes of the other rat were unaffected. None of the rats or guinea-pigs developed any nervous symptoms. The monkeys had only been recently inoculated when I (H. W. G.) left Sierra Leone.

The temperatures of the guinea-pigs ranged between 102° and 104° F. The temperatures of the rats ranged between 100° and 102° F. (Seventy-nine observations on one rat.)

When inoculating animals, the blood was first received into a solution of sodium citrate and chloride 1 per cent. and 5 per cent., and the blood diluted many times.

The temperatures of the animals were taken by Corporal Simes, R.A.M.C.

Experiment I. Guinea-pig.—To note the effect of the injection of blood from Private Momo Yeto into Guinea-pig.

July 10th, 1905.—Examined guinea-pig's blood. No trypanosomes seen. Injected a few drops of blood from Private Momo Yeto's finger into peritoneum. The blood contained trypanosomes.

October 9th.—A corneal ulcer and pus in the anterior chamber of one eye noticed.

October 10th.—Died.

Remarks.—The trypanosomes first appeared in the blood thirty-three days after inoculation. The animal did not show any outward signs of illness until a few days before its death. It took its food well, its coat was glossy and its eyes bright. A few days before death its coat lost its glossiness and the animal became very thin.

TABLE SHOWING PRESENCE OR ABSENCE OF TRYPANOSOMES IN THE BLOOD OF GUINEA-PIG.

Date.		Trypanosomes in blood.	Weight in grammes.
July	10, 1905	–	
,,	15, ,,	–	474
,,	17, ,,	–	448
,,	18, ,,	–	434
,,	20, ,,	No observation	445
,,	31, ,,	,, ,,	401
August	11, ,,	+	465

Date.		Trypanosomes in blood.	Weight in grammes.
August	13, 1905	No observation	455
,,	14, ,,	+	
,,	15, ,,	+	480
,,	21, ,,	+	465
,,	22, ,,	+	
,,	23, ,,	+	
,,	24, ,,	+	
,,	26, ,,	+	
,,	28, ,,	+	485
September	3, ,,	+	
,,	10, ,,	+	
,,	14, ,,	+	
,,	28, ,,	+	
October	3, ,,	+	340
,,	6, ,,	+	
,,	9, ,,	No observation	305
,,	10, ,,	+	
		Died.	

Experiment II. Guinea-pig, ♀.—To note the effect of the injection of blood from Private Momo Yeto into Guinea-pig.

July 10th, 1905.—Injected about six drops of blood from the finger of Private Momo Yeto into the peritoneum. The blood from Momo Yeto contained trypanosomes, from three to four per cover.

August 14th, 1905.—Trypanosomes seen in the blood, thirty-six days after inoculation. The guinea-pig appeared to be in perfect health until December 19th, when its coat began to lose its sleek appearance.

December 21st, 1905.—Found dead. It had given birth to two young ones during the night. They were both dead.

Post Mortem.—Placenta retained, but not adherent. Spleen small, measured 4 by 1·75 c.mm. Weight 2·15 grammes. The most noticeable feature was the large size of the liver; it weighed 21·6 grammes. The dead guinea-pig weighed 410 grammes.

TABLE SHOWING PRESENCE OR ABSENCE OF TRYPANOSOMES IN THE BLOOD OF GUINEA PIG.

Date.		Trypanosomes in blood.	Weight in grammes.
July	10, 1905	–	
,,	15, ,,	–	465
,,	17, ,,	–	
,,	18, ,,	–	
,,	30, ,,	No observation	425
August	10, ,,	–	
,,	14, ,,	+	
,,	15, ,,	+	
,,	18, ,,	No observation	518
,,	21, ,,	–	530

Date.			Trypanosomes in blood.	Weight in grammes.
August	22,	1905 ..	.. –	
,,	23,	,, ..	.. –	
,,	26,	,, ..	.. –	
,,	28,	,, ..	.. +	
,,	29,	,, ..	No observation	.. 505
September	2,	,, ..	.. +	
,,	6,	,, ..	.. +	
,,	10,	,, ..	.. +	
,,	15,	,, ..	.. +	
,,	18,	,, ..	.. +	
,,	20,	,, ..	.. +	
,,	29,	,, ..	.. +	
October	3,	,, ..	.. +	
,,	6,	,, ..	.. +	
,,	11,	,, ..	.. +	
,,	12,	,, ..	.. +	
,,	16,	,, ..	.. +	
,,	25,	,, ..	.. +	.. .. 559 (pregnant)
November	3,	,, ..	.. +	
,,	6,	,, ..	.. +	
,,	10,	,, ..	.. +	
,,	14,	,, ..	.. +	
,,	18,	,, ..	.. +	
,,	24,	,, ..	.. +	
December	2,	,, ..	.. +	.. .. 622·5
,,	12,	,, ..	.. +	
,,	20,	,, ..	.. +	.. .. 523·5

Experiment III. White Rat, ♂.—To note the effect of the injection of blood from Private Momo Yeto into White Rat.

July 5th, 1905.—Examined blood for trypanosomes. Negative.

July 10th, 1905.—Examined blood for trypanosomes. Negative. Injected a few drops of blood from Private Momo Yeto's finger into rat's peritoneum.

September 20th, 1905. A trypanosome was seen in the blood for the first time. Incubation period, seventy-three days. The blood had not been examined since August 28th.

October 27th, 1905.—Rat keeps very quiet.

October 31st, 1905.—Rat is anæmic. The eyes are losing their pink colour. A stained blood film shows many trypanosomes, chiefly the long form with many granules in their protoplasm. The red cells show polychromatophilia.

November 22nd, 1905.—Blood swarming with trypanosomes. Rat killed by chloroform.

Post Mortem.—Spleen enlarged, measured 7·5 by 1·25 c.mm.

TABLE SHOWING PRESENCE OR ABSENCE OF TRYPANOSOMES IN THE BLOOD OF WHITE RAT.

Date.			Trypanosomes in blood.
July	5,	1905	–
,,	10,	,,	–
,,	15,	,,	–
,,	17,	,,	–
,,	18,	,,	–
August	14,	,,	–
,,	15,	,,	–
,,	28,	,,	–
September	20,	,,	+
October	3,	,,	+
,,	6,	,,	+
,,	11,	,,	+
,,	13,	,,	+
,,	16,	,,	+
,,	25,	,,	+
November	22,	,,	+

Rat killed by chloroform.

Experiment IV. White Rat, ♀.—To note the effect of the injection of blood from Private Momo Yeto into White Rat.

July 5th, 1905.—Examined blood for trypanosomes. Negative.

July 10th, 1905.—Injected a few drops of blood from finger of Private Momo Yeto into peritoneum.

December 4th, 1905.—This rat was looked upon as a failure. At 2 p.m. it was noticed to be dying from dyspnœa. Tail blood, venous. One cover showed one dying and one dead trypanosome. Polychromatophilia and nucleated red cells present. The rat died gasping for breath.

Post-mortem.—A few trypanosomes seen in stained specimen of heart's blood. The rat is fat and well nourished. No obstruction to air passages. Throat, larynx, trachea and bronchi examined. Tissues generally anæmic. Lungs pale. Spleen measured 5·5 by ·75 c.mm.

TABLE SHOWING ABSENCE OR PRESENCE OF TRYPANOSOMES IN THE BLOOD OF WHITE RAT.

Date.			Trypanosomes in blood.
July	5,	1905	–
,,	10,	,,	–
,,	15,	,,	–
,,	17,	,,	–
,,	18,	,,	–
August	14,	,,	–
,,	15,	,,	–
,,	28,	,,	–
September	20,	,,	–
,,	21,	,,	–
,,	22,	,,	–
October	3,	,,	–
December	4,	,,	+

Died.

Examination of the West African Regiment, for further Cases of Sleeping Sickness.

When the case of Momo Yeto was reported we made an inspection of the regiment at headquarters (Wilberforce). The inspection consisted of palpating the cervical glands, and it was not until November that the inspection of this regiment was completed, owing to a number of men being absent on furlough. We picked out nineteen men on account of enlargement of the cervical glands. Gland puncture was performed in all. We found trypanosomes in the gland juice of three men, Privates James Gaba, Makan Kamara, and Momodu. The first two men are employed as hospital messengers, so that they can be kept under constant observation and their treatment with arsenic and atoxyl carried out regularly.

No. 2573. *James Gaba.*—A Mendi from the town of Tikonko in the Bandyjuma District, Sierra Leone Protectorate. He lived there until 1900, when he came to Freetown and obtained employment as a carrier in the Ashantee War of 1900-01. He was about six months in Ashantee, and then returned to the Sierra Leone Protectorate, where he was employed as a Court Messenger for four years. He subsequently returned to Freetown and enlisted in the West African Regiment on April 14th, 1905. He is a tall, well-built, muscular man, aged about 24. He says that he has never suffered from sickness of any kind, with the exception of slight enlargement of the cervical, inguinal and femoral glands; nothing abnormal can be detected by examination. Has no nervous symptoms, neither tremor of the lips, tongue nor hands; and his superficial and deep reflexes are normal. The glands are somewhat soft to the touch; there is no periadenitis.

August 26th, 1905.—Gland puncture, left posterior cervical: eighteen active trypanosomes seen per cover. Two covers of blood examined; no trypanosomes seen. Auto-agglutination present.

August 28th, 1905.—Blood count (H. W. G.): Red blood corpuscles, 5,580,000; white blood corpuscles, 8,660; hæmoglobin, 82 per cent. (Gowers).

August 29th, 1905.—Stool examined. Ova of *Ankylostomum duodenale* present. Gland puncture, right posterior cervical: one trypanosome seen.

August 31st, 1905.—Has been in hospital since August 26th, 1905. When admitted there was a small ulcer on the back; nothing of interest was seen in a stained film from this ulcer. He complains

of being kept in hospital. He feels perfectly well and is anxious to get back to his duty.

September 6th, 1905.—Weight in regimental clothing, without accoutrements, 12 st. 3 lbs.

October 20th, 1905.—Employed as hospital messenger. Temperature recorded twice daily. Ordered $\frac{1}{50}$ grain arsenious acid by the mouth daily. He walks every other day to Tower Hill and back (six miles).

November 2nd, 1905.—Administration of atoxyl commenced; $\frac{1}{5}$ grain given hypodermically every other day. These injections caused no pain or inconvenience of any description.

November 30th, 1905.—The arsenic appears to have had a good effect on his temperature. Gland puncture, left cervical: several actively motile trypanosomes seen. The temperature has not been above 99° F. for the last twelve days. Gland puncture, right and left femoral: no trypanosomes seen; the preparations of gland juice were bad ones.

December 4th, 1905.—Blood count (E. W. C.): Red blood corpuscles, 4,884,000; white blood corpuscles, 10,185 per c.mm.

December 19th, 1905.—Weight in regimental clothing, without accoutrements, 11 st. 10 lbs. One-fifth grain of atoxyl has been given hypodermically every other day since November 2nd, 1905.

Captain A. H. Morris, R.A.M.C., informs us that Private James Gaba died from acute pneumonia in February last.

No. 2201. *Private Makan Kamara.*—Belongs to the Joliffe tribe which inhabits the French territory north of the Sierra Leone Protectorate. His enlisted age is 26, but he is probably older. There is great difficulty in gauging accurately the age of recruits, as they themselves have no idea of time, and even if they understand the question when asked how old they are, probably reply "6 years" or something equally absurd. He enlisted on December 24th, 1902. He appears, from his own account, to have had an adventurous life up to this time, as he says he has fought against the French on three different occasions, and his reason for enlisting in the British Service was that the French had killed some of his relations. He was also a slave dealer in a small way, and says that he used to catch men belonging to unfriendly tribes and take them down to Conakry and sell them as slaves. He asserts that he has sold over twenty men as slaves, and by doing so "he done catch plenty copper." He is a man of fairly good physique, and is tall for a West African. He has a general enlargement of the superficial

glands. His skin is dry and scaly; his gums are unhealthy, pyorrhœa being present.

Private Makan Kamara was in hospital from July 13th, 1905, to August 5th, 1905, for acute pneumonia. The highest temperature recorded during convalescence (July 24th to August 4th) was 98·8° F.

August 26th, 1905.—Gland puncture, right and left cervical: no trypanosomes seen.

August 29th, 1905.—Gland puncture, left femoral: one active trypanosome seen. Two cover-slips, finger blood examined: no trypanosomes seen; auto-agglutination present.

October 29th, 1905.—Employed as hospital messenger. Temperature recorded twice daily. Ordered $\frac{1}{50}$ grain arsenious acid daily.

November 2nd, 1904.—Administration of atoxyl commenced; $\frac{1}{5}$ grain given hypodermically every other day.

November 4th, 1905.—Blood count (E. W. C.): Red blood corpuscles, 4,800,000; white blood corpuscles, 1,100. Gland puncture, right cervical (H. W. G.): four active trypanosomes seen.

November 6th, 1905.—Weight, 10 st. in regimental clothing, without accoutrements.

December 18th, 1905.—Weight, 9 st. 12 lbs. in regimental clothing, without accoutrements.

Captain Morris writes that Private Makan Kamara died after a fortnight's illness, from "some form of colitis," in February last.

Momodu.—The fourth case, Private Momodu, was picked out on November 11th, 1905. On puncturing the left posterior cervical gland several active trypanosomes were seen. He is a recruit of a few months' service, and comes from the Bambara country, which is in French territory north of the Sierra Leone Protectorate. He is about 20 years of age, and is of poor physical development, though apparently healthy. There are no nervous symptoms, no tremors, &c. As far as can be made out he appears to have travelled about in French country as a carrier, and has been to Conakry several times. He talks very little English, and it is difficult to get information from him as to his past history, as, even with the assistance of an interpreter, his answers are rather unsatisfactory. He had visited Sierra Leone the year previous to enlistment, and he then returned to his own country and came back again and enlisted in July, 1905. He states that he has never been farther down the coast. He does not complain of anything.

The right femoral gland is much enlarged and measures 5·5 by

2·5 cm. The left femoral is also enlarged. The inguinal glands are distinct. There is a general enlargement of the glands along the posterior margin of the sterno-mastoid. No glands can be felt in the axilla.

We palpated the cervical glands of 1,020 N.C.O.'s and men of the regiment. There was no marked difference in the gland incidence of companies. Of the four cases of trypanosomiasis all belonged to different companies.

John Try, No. 2590, was one of the cases of enlarged glands in which we failed to find trypanosomes. Gland puncture was performed eleven times. Gland juice from the right and left cervical, right and left femorals, left axillary and epitrochlear glands, was examined with a negative result.

On October 30th, a monkey, *Cercopithecus cynosurus* (?), was inoculated with 10 cc. of blood from the median basilic vein, and a guinea-pig with 2 cc. On December 15th both animals were negative.

Private John Try had *Filaria nocturna*. On examining the blood at 10 p.m. from one to three filaria were seen per cover. An examination of nine thick covers at 3 p.m. showed only one filaria. No filaria were seen in the gland juice. Some of the preparations of gland juice were excellent and we fully expected to find active trypanosomes, but failed to do so. The phenomenon of auto-agglutination was present in the blood. The man stated he felt quite well.

In another case a filaria was seen in the juice from a femoral gland. Examination of ten thick covers of blood by night showed no filaria.

Captain A. W. Sampey, R.A.M.C., drew our attention to an entry in the admission and discharge book of the West African Regimental Hospital at Magbele. It was as follows:—

"No. 633 Private Kabba Lambo, aged 24, transferred to headquarters for invaliding, April 8th, 1904; disease, sleeping sickness." We were unable to find any detailed history of this case. On arrival at headquarters his disease was changed to suppuration of lymphatic glands, April 15th, 1904. His disease was again changed to epilepsy on June 21st, 1904. He died on September 28th, 1905.

One of us palpated the glands of 280 natives in the village of Yonnibannah, where Private Momo Yeto came from. None had typical enlargement of the cervical glands. These glands were

palpable in thirteen cases. Both femoral glands were punctured in six of these cases. No trypanosomes were seen. Specimens of a small tsetse-fly caught in this village were forwarded to the Editor of the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS. They proved to be *Glossina palpalis* (Austen). We caught *G. palpalis* in the Hill Station about one mile from barracks.

Thoma Zeiss' apparatus was used for the blood counts. In estimating the number of red cells a minimum of 1,000 corpuscles was counted. We used both the red and white pipette for counting the leucocytes.

The measurements of three stained specimens of the trypanosomes from Private Momo Yeto's blood were as follows: 27 μ by 2 μ, 24 μ by 2·3 μ, and 17 μ by 2 μ. They were measured by a standardised eyepiece micrometer, and also by a Leitz' drawing camera. A scale is first projected, and drawn, a slide with a stained trypanosome is then substituted for the scale, and the image is thrown on the paper above the scale. Then with a piece of fine thread and a pair of forceps the trypanosome is measured.

For gland puncture we prefer the ordinary all-glass hypodermic syringe with a fine sharp needle. A blunt needle causes pain.

One of us is submitting a short paper on gland palpation and puncture, with especial reference to trypanosomiasis amongst the civil population of Sierra Leone. In it will be included some remarks on the distribution of *G. palpalis*.

THE LIMIT OF USEFULNESS OF INFECTIOUS HOSPITALS.

By Major C. J. W. TATHAM.
Royal Army Medical Corps.

This title forms at present a much debated subject. One may almost say the trend of professional opinion is towards the conclusion that the usefulness of infectious hospitals is not commensurate with their cost. That may possibly be, but I think the explanation is that too much in the way of stamping out disease was expected from them.

There are certain diseases in which the utility of isolation hospitals is not questioned, such as small-pox, cholera, plague and, up till recently, yellow fever. In these, for the sake of others, isolation is most desirable. Diphtheria is a disease which in this country is usually transferred to an infectious hospital if one is available. I am not sure that this is really necessary, though in cases occurring amid insanitary surroundings it may be an advantage to the individual. But as a rule it is not the diagnosed and notified case of diphtheria that spreads the disease, so much as the undetected scarcely ailing child of school age whose fauces are full of bacilli whilst it mixes freely with its playmates at school. I think cases of diagnosed diphtheria can, if desired, be sufficiently isolated in most homes.

The question of the utility of infectious hospitals, however, turns mainly on the effect, if any, they have had in lessening the spread of scarlet fever, and to this question my remarks will chiefly apply. Isolation in hospital has certain distinct disadvantages in this disease, some of which are unavoidable. For instance, isolation in infectious hospitals under the system usually met with is simply "aggregation," often very much to the detriment of a slight case. There is a distinct liability for the individual sent to hospital to contract infectious diseases other than that for which he was admitted. Cases that have been isolated in hospital far more frequently give rise to what are known as "return" cases than those isolated at home. There are great difficulties in connection with "doubtful" cases sent to hospital and those which have been wrongly diagnosed. Better administration may minimise some of these, but always at greater expense.

Even such disadvantages might be tolerated if we were able to

show that in spite of them, by isolation in hospital we were able to diminish the sum total of scarlet fever amongst our population. But it is said that we cannot do this, that, on the contrary, if we compare any two districts in the United Kingdom in one of which isolation hospitals are available and are used for the majority of cases of scarlet fever, and in the other, there being no isolation hospital available, cases of the disease are treated at home, we shall find that instead of being lessened, more often than not the annual attack rate per 1,000 of the population is slightly higher in the districts using isolation hospitals than in those without them. Such statistics (see Table A) were given by Dr. Wilson in opening the discussion on isolation hospitals at last year's meeting of the British Medical Association at Leicester, and also by Dr. O'Connor (see Table B). Dr. Killick Millard, the Medical Officer of Health for Leicester, who was one of the earliest to express his doubts as to the utility of isolation hospitals for scarlet fever, has published a series of statistics (see Table C) to show that on two occasions, in 1903 and 1904, in that town when the infectious hospital was required for small-pox and no scarlet fever could be admitted—and, what is more, on the first occasion ninety-eight cases of scarlet fever which had been admitted were suddenly returned to their homes in all stages of the disease, yet, as the result of this and the subsequent cessation of treatment in hospital, no abnormal increase of the disease could be shown. Such figures undoubtedly tend to show that isolation in hospital is a failure in stamping out the disease—is not worth the expense; and one gentleman, a paper of whose I accidentally came across, went so far as to recommend that all isolation hospitals for scarlet fever should be at once converted into sanatoria for tubercle cases.

But although we must admit that we have not succeeded in stamping out scarlet fever by isolation, perhaps we may say that the milder type of the disease so commonly seen, may in part be due to it. And in spite of the figures (statistics are often fallacious) I cannot but believe that with our increasing urban population, if in the last twenty-five years we had not largely utilised isolation hospitals, the spread of scarlet fever would have been greater. None of us will deny that scarlet fever is an infectious disease—infectious more or less throughout its course—and it seems to me to stand to reason that for every case we isolate which is not followed by a second case in the same household, we have by isolation destroyed a potential focus of the disease; so that it must be of some use. Dr. W. N. Barlow gives some instructive

figures from Bootle of cases treated at home and cases removed to hospital, and the results in secondary cases:—

—	Number of cases	Houses infected	Number of houses where further cases occurred	Percentage of houses in which second cases occurred
Home cases	133	91	25	27·4
Cases removed to hospital	220	187	121	6·0

Granting that isolation hospitals have failed to a certain extent in stamping out scarlet fever, in my opinion this is chiefly due to the etiology of the disease not being completely understood.

Scarlet fever may be said to spread in two distinct ways: (1) By direct infection to other persons in close contact, *i.e.*, the other inmates of an infected house; (2) in some indirect manner not yet properly understood. In this second class are included all those untraced cases of scarlet fever which I believe one is correct in saying constitute the great majority of the cases of this disease occurring in urban districts. These untraced cases are usually considered as having been infected by "slight unrecognised cases," or contracted in some public building or conveyance. Possibly this is the true explanation of many, but there are such numbers of these "sporadic" or *de novo* cases, that I have always felt that the above explanation is insufficient.

Dr. Millard, in one of his papers, says "that probably there are still other causes of which as yet we have no knowledge," but he does not attempt to indicate any.

I would wish to suggest *one* which, if true, may explain the constant occurrence of sporadic, untraceable cases of scarlet fever amongst our urban population, in spite of all we try to do by isolation; and it would also explain how it is that isolation fails. In the two causes for the spread of scarlet fever given above no mention is made of the causation of the disease by milk. And yet no one, I suppose, would deny that there is such a thing as a milk epidemic. But where the milk supply is the origin of an outbreak it may produce it in two ways: (1) By the milk having become contaminated with the poison of scarlet fever from a pre-existing case; (2) by the introduction of the poison direct from the *cow giving the milk*, the animal at the time suffering from a constitutional disease, which, besides producing visceral lesions, causes local manifestations in the shape of inflammation and ulceration of the udder and teats. There are now several authenticated

instances of outbreaks due to this second cause in which contamination of the milk from a pre-existing case of human scarlet fever could be absolutely excluded, for example, the outbreak in Marylebone in 1885, where the disease was traced to a milk supply coming from a dairy farm at Hendon in which were several cows suffering from this form of disease, and from which all contact with pre-existing human scarlet fever could be excluded. There have been several other instances, as at Oxford, in Glasgow, and in Camberwell, South London. Two isolated cases in the family of a Staff Officer in Jamaica, West Indies, occurred in my experience, when there was no scarlet fever in the island. The family (there were only these two children) were living far from any one else in the hills; there was no possible explanation of the disease to my mind till the father happened to inform me that in order to provide the children with fresh milk he had recently bought two cows which had only lately been imported into the island from the States. I carefully examined these cows, and one of them certainly had some form of desquamating skin disease of the udder.

It is said that we do not know the micro-organism causing scarlet fever. On the other hand, Dr. Klein—who investigated the Hendon outbreak—says he does; the *Streptococcus scarlatinæ* of this observer obtained from the skin and blood of human scarlet fever produced general infection when inoculated into calves and mice, and the same Streptococcus was recovered from them on cultivation. Further, six milch cows inoculated with this Streptococcus obtained from human sources reproduced the typical symptoms of the Hendon disease in the cows, as the result of the inoculation. Gordon's researches confirm those of Klein, and he claims that by culture experiments he is able to differentiate it (*S. scarlatinæ*) from the *Streptococcus pyogenes*.

It may be urged that these facts indicate a *prima facie* case against milk in the causation of scarlet fever without the intervention of contamination from human sources.

If this be so, the question of the usefulness of infectious hospitals in stamping out scarlet fever turns upon the point whether this disease, as we know it in English towns, is chiefly spread by infection from sick to healthy, or in a way hitherto not sufficiently suspected or understood, as, for instance, drinking unboiled milk. Amongst the characteristics of milk scarlatina are: it is not very communicable from person to person; its incidence is heavier on children, women and young adults; the epidemics are mild and have

a low case mortality. All points which are true of the disease at the present time.

I would venture to suggest that where an epidemic outbreak of scarlet fever occurs, due to the milk supply, it is epidemic because the virulence of the infection present in the milk was more than ordinarily potent or more concentrated than usual. But the ordinary milk supply of a large town is, as we know, a heterogeneous mixture from various sources, and I would contend that quite possibly—even probably—the poison of scarlet fever derived from bovine sources is very frequently present in it in minute quantity. Granting this, there are two possible explanations of the frequent occurrence of sporadic cases of the disease amongst our urban population rather than an epidemic outbreak, viz.: (1) The existence of the poison in the milk supply in a very dilute condition and perhaps not in all samples; and (2) the question of the susceptibility of the individual. I mean, that the poison of the disease in this dilute condition is only capable of causing an attack, and that, a mild form, in persons who are unusually susceptible and at a particularly susceptible age, viz., the age period in children from 5 to 10.

Whether the suggestion I have made as to the more frequent causation of cases of scarlet fever from bovine sources than has been generally supposed is true or not, I feel convinced that there must be some other factor at work besides infection from person to person, to account for the continued failure of our methods of isolation, disinfection, &c., in lessening the spread of the disease. I cannot but think that the milk supply, from what we know of it, in some way or other, is likely to furnish this cause.

In opposition to isolation, except for imported cases, I should like to be able to try, in any given district with a large urban population, the *compulsory* sterilisation of all milk before it left the dairy. I am certain that in households where it is the rule to sterilise or boil the milk as soon as it is received, there is a much smaller incidence of infectious disease.

The slightly greater incidence of scarlet fever shown in Drs. Wilson and O'Connor's statistics for districts using isolation hospitals over those in which they were not available, might be explained by the fact that in the districts which have isolation hospitals the population is more distinctly urban in character, and in such a district the milk supply is a mixture from a variety of sources, and hence more likely to contain the infection than the supplies of a more widely scattered population.

The isolation of scarlet fever has its uses: except in return cases it limits the spread of the disease from person to person, and in some cases it is beneficial to the individual to be removed from insanitary surroundings and treated in a hospital. That, I fear, is the extent of its usefulness, and for that, it is a very expensive remedy. I do not believe that it will ever eradicate the disease in the way, for instance, that rabies was stamped out, for as I have already said, I am convinced that scarlet fever has, whatever the avenue may be, some other line of attack. The facts seem to point to this being the milk supply. In this connection, why is it that on the Continent scarlet fever is so much less frequent? May not this be due to the habit of the population—in France and Germany—namely, drinking all their milk hot after it has been scalded?

I would not give up isolation, even with all its expense, at least at present, we should only be confusing ourselves by adding another possible cause for the propagation of the disease; but I would pay more attention to the milk supply both at its source and on its entry into the household. As an example, the recent notable discovery of the propagation of Malta fever through goats' milk, the chief milk supply of the island, will be remembered. How much work was necessary before this was established, and how much doubt and uncertainty previously existed as to the main avenues by which this disease was spread.

TABLE A.

DR. GEORGE WILSON'S STATISTICS.

(COLLATED FROM THE ANNUAL REPORTS FOR 1902-4.)

Mid-Warwickshire Combined Districts' Statistics.

	Mean annual population, 1902-4	Average annual attack. Rate per 1,000 of population	Total number of cases admitted into hospital, 1902-4	Total number of cases notified, 1902-4	Percentage of admissions to cases notified	Total number of deaths, 1902-4	Average annual death-rate per 1,000 population	Average annual fatality, rate per cent. of cases notified
Districts *with* hospitals	82,020	4·96	803	1,222	65	23	0·093	1·88
Districts *without* hospitals	57,610	4·80	—	831	—	14	0·081	1·68

TABLE B.

DR. J. E. O'CONNOR'S STATISTICS.

Leicestershire and Rutland Combined Sanitary Districts.

	Population	Notified cases	Removed to hospital	Percentage removed to hospital	Attack rate
Group I., where isolation hospitals were available	6,562	372	245	66	6·2
Group II., isolated at home—hospitals as a rule not available	7,060	182	26	14	2·8

TABLE C.

DR. KILLICK MILLARD'S STATISTICS.

Leicester.

	Number of infected houses	Number of houses in which the spread occurred	Number of secondary cases	
1903— January 29th to July 30th	241	22	25	These figures show no abnormal increase as compared with periods when the hospital was available and isolation in hospital carried out.
1904— March 28th to June 30th (During both these periods all cases of scarlet fever treated at home)	44	4	6	
Total ..	285	26	31	

ENTERIC FEVER: A WATER-BORNE DISEASE.

By Major NORMAN FAICHNIE.
Royal Army Medical Corps.

In a recent letter to the *Times*, under date October 17th, 1905, by Surgeon-General Sir Thomas Gallwey, it was stated that the following, in order, were considered the chief factors in the causation of enteric fever: personal contact, ambulatory cases, latrines, dust, flies, milk, fruit and raw vegetables, bazaar products, especially sweets and aerated waters; and that the steps now being taken for its prevention in India are: (1) isolation, (2) disinfection, (3) evacuation of barracks, (4) segregation of drafts. The views which I held on the subject until recently were, that though water was the chief cause, the factors enumerated above were of considerable importance, especially in India. After fifteen months' duty, however, as Sanitary Officer of the Home Northern Command, I have completely altered my opinion, and now firmly believe that, compared with water, others are of very little importance in its causation. I include under the head of water all such things as can be polluted by it, *e.g.*, milk, raw vegetables and bazaar aerated waters, but I consider of quite inappreciable importance infection from personal contact, ambulatory cases, latrines, dust and flies. As there can be no subject of greater importance to the officers of the Royal Army Medical Corps, I venture to bring forward my reasons for holding these views.

Barracks.—On going round barracks in England one is struck by the fact that, in many ways, they are not in such a good sanitary state as those in India. Take Manchester, for instance, where the barracks are situated in the heart of the slums of a densely populated city. The men's rooms are above the stables, quite close to manure and stable drains; latrines are damp and dark, and are flushed about four times a day. Kitchens, stables and latrines are quite close to each other, and flies abound in the summer. In the married quarters, till within a few months ago, six families shared one kitchen sink between them; the latrines are situated outside, so that in winter other arrangements are probably made at night. Or, again, take Warrington. The drains are constructed with practically no fall, so that the surface water and the urine lie often in a state of stagnation; the latrines are on the pail system, and are emptied four or five times a week by the Corporation, who

will not allow the use of earth, as it increases the work of the Borough destructor. In addition, tubs are used as night urinals almost entirely throughout the Command. These two towns alone seem like places where typhoid fever ought to flourish, and yet no cases occurred in either, nor in any station in the Command, except at Beverley, the only place that has a bad water supply.

Except the water supply, in my opinion there is no essential difference between barracks in England and those in India, to account for the variation in the admission rates.

British troops	Strength	Admissions	Rate per 1,000
1903			
India	69,613	1,366	19·6
England	100,246	66	·8

Camps.—During the past year I have inspected camps of Regulars, Militia and Volunteers throughout the Command. Thousands of young men, most of them of the most likely age to get enteric fever, and ignorant of, or thoughtless about sanitation, have been out for various periods without a single case having been notified as being contracted in camp. This goes on year after year here in the North with the same result. Some of the camps are occupied for only a few days, but others for three and four months continually at a time. Latrines are sometimes trenches, but generally on the pail system. It is extremely unlikely that urinals are used at night, so that in course of time the soil is soaked with hundreds of gallons of urine. Flies and dust abound in some of the camps, and it is very probable that some of the men suffer from typhoid bacilluria. Some crowded camps that are partly permanent, and that have been occupied several years in succession, have latrines and kitchens as close as fifty yards to each other. In all these camps there was no advantage, that I could see, over those in India, with one exception, that every camp, even if it were occupied for only a week in the year, was supplied with water brought in pipes, sometimes at great expense, from a recognised pure source. The last cases that occurred in camp were in 1899, at Strensall. At that time the water supply was a local one, liable to pollution from surface manure; since York water was laid on in 1900 no case has occurred. In the early summer of last year, when I thought dust and flies were important in spreading the disease, I lived in dread of cases occurring in at least two camps,

but nothing happened, nor has it, under similar conditions, for years, so that the conclusion is forced on me that, given a good water supply for drinking and all washing purposes, it is almost impossible to get enteric fever.

Infection by Dust and Flies.—Milk is admittedly a perfect bacteriological medium, many times more so than water, so that if two flies infected with typhoid microbes settle on a tumbler of milk and a tumbler of water respectively, in a few hours it would be much more dangerous to drink the milk than to drink the water. Consider the conditions under which milk is supplied to a city like Leeds. It comes from numerous farms which are notoriously in an insanitary state. Dung-plastered cows are milked by unwashed hands, in badly drained cow-sheds, in the dark hours of the early morning, and the milk sent from various parts of the country by train, with all the microbes growing by millions. The milk is often then left unprotected in town dairies or cheap grocery shops, and after it is delivered, kept uncovered in the homes of the poor, and seldom, if ever, boiled before use. This occurs in a densely populated city like Leeds, which rejoices still in nearly 5,000 privy middens, abominations in sanitation, that are cleaned once a month. Then take any month when it is hot, and dust and flies are at their worst, and, I think, we get ideal conditions for dust and fly-borne disease. Yet, on turning to the notifications for Leeds, with a population of 450,000, in September, 1904, we find: Enteric fever, from all causes 26, or 0·05 per 1,000 for the month. Where does dust or fly-borne infection of milk come in here, and if milk is infected so little, what fraction of cases is due to dust-infected water, which is not nearly so favourable a medium? Some measure of the actual amount of enteric fever due to flies and dust may, I think, be gauged by comparing the admissions for this disease of a city like Manchester, population 558,000, for the year 1903 with other years. In that year the summer was very wet and cold, therefore flies were scarce, dust was absent, filth was washed away instead of lying about, and fly-borne disease would be at its minimum; and yet there is very little difference between this and other years. So that a large town like Manchester, which is crowded and generally insanitary, and very well suited from the conditions of its milk supply for the spread of fly-borne disease, gives no positive indication of any having occurred, and therefore, if the infection of milk is small, that of water is very much less; and yet, in India, where the dangers of milk are so well guarded against that, as a cause of disease, it can be ignored, epidemics are

attributed to water being infected in this way. It seems to me, then, that although infection by these media has been proved to be possible, the positive evidence that it ever does occur to any great extent is very slight.

Nature of Incidence when Caused by Polluted Water.—One of the greatest difficulties to me in accepting the idea that enteric fever is solely a water-borne disease was the nature of its incidence in India, where various people using the same water supply were affected in different degrees, and some, not all, without any semblance of reason, while it is generally considered that the incidence should be uniform among those using the same water. As this is a difficulty which appears to trouble others, as well as myself, I may be excused for explaining at some length why I now think that there is nothing in its incidence in India to exclude water as a cause. Some of my reasons are drawn from observations made during the analysis of water in the laboratory, others from the study of epidemics.

The bacteriological water-carrier supplied in the Army consists of a small bottle with a capacity of about half a pint. The bottle having been first shaken up, portions of the water are mixed with corresponding amounts of bile salt broth and put in the incubator. After twenty-four hours, one tube may have become acid, another acid with the formation of gas, a third may have remained alkaline. That is to say, the composition of samples of a small volume of water like half a pint may entirely vary in character. The deduction from this is that if the composition of a small amount varies, that of a large volume may also vary so much that different people with the same water supply may be using water of entirely different characteristics. Again, in collecting a sample for analysis, directions are given that an examination shall be made as soon as possible, and experience teaches that a sample arriving in twenty-four hours has a different character from a sample of the same water that takes forty-eight or seventy-two hours to come. Therefore, water stored in "chatties," even if it be fairly uniform at first, may entirely vary according to the time it is stored, and a draught that is drunk at once is purer than another stored for some days, owing to the development of the microbes contained therein from the beginning. This may sound like a laboratory theory, but on turning to Dr. Thresh's book on "Water and Water Supplies," we read: "Water engineers now avoid 'dead ends' as far as possible. Near 'dead ends' there is always a tendency for sedimentary matter to be deposited, and for

bacterial and fungoid growths to develop." These, then, are some reasons why water does vary in character, and why, considering the very small quantity of water examined, a bacteriological analysis giving a negative result does not by any means prove that the water is necessarily pure.

A third reason why water may vary in composition in India is that it is so often stored in vessels, even when there is a piped supply. The microbes fall to the bottom and to the sides, and very soon a slime is formed containing vast quantities of bacteria. It is evident, then, that the quality of the water subsequently put in or taken out of uncleansed "chatties" does vary according to the bacterial quality of the slime in the different vessels, and that one of several vessels may contain polluted water, while the others may contain wholesome water. Moreover, a storage vessel once polluted may give out polluted water in gradually diminishing strength till all the harmful bacteria are washed away.

Other facts may be learnt by the study of an explosive typhoid epidemic like that of Lincoln in January, 1905. The water supply of this city was a sewage-polluted river purified by sand filtration, which, for six weeks, was working unsatisfactorily, and impure water (*Bacillus typhosus* was not found) was supplied, and nearly one thousand cases of typhoid resulted. The cases fall into two divisions:—

Primary cases in the six weeks before any correction of the sand filter was made	747
Secondary cases—first month	164
,, ,, second month	71
,, ,, third month	11
,, ,, fourth month	3
Total ..	249

The secondary cases all occurred after the filter had been purified, so that according to the experts "no germs could have remained in the waterworks unless some reinfection took place from the 'dead ends' and cisterns." Thus, secondary cases occurred while water, pure at its source, was flowing through the system of polluted pipes. It was proved that the whole of the water of the city of Lincoln was polluted with sewage, and the incidence was 1,000 cases, or 2 per cent. of the population. In the barracks using the same water no women or children, and only four men, contracted the disease, and yet this was an undoubted water epidemic lasting about five months, as the result of a pollution that lasted six weeks. One cannot help wondering what would

have happened if the pollution had lasted a few days and only a few cases had occurred, spreading over a month or two. What would it have been put down to? Probably anything but water, because the incidence would have still less resembled that of a water epidemic.

With regard to the secondary cases, viz., those occurring after pure water is again running, though the pipes are still fouled, in some reports it is stated that very little is known as to their cause, and they are attributed to personal infection, to drainage, and to ambulant cases. I think it is more reasonable to attribute them to the poison which remains in "dead ends" and cisterns, and which is present in the bacterial slime lining the water-pipes, being gradually washed off by the pure water as the secondary cases get less and less each month, and disappear altogether when the pipes are completely cleansed. That this must be so is shown by studying typhoid epidemics due to milk, which are noted for their non-contagiousness. Thus, while the water epidemics at Lincoln and Worthing lasted five months, and that at Maidstone four months, the milk epidemics at Glasgow (508 cases) lasted one month, at Dundee (118 cases) one month, at Marylebone (244 cases) two months, and others for similar short periods. If the secondary cases are due to ambulant attacks, personal infection, or to drains infected by the primary patients, and not to the poison remaining in the uncleansed water-pipes, why does a milk epidemic stop dead when the infecting cause is removed? And why are there no secondary cases in a milk epidemic where personal infection should have as much influence, and where the drains are as much infected? It must be remembered that in the Maidstone epidemic the suspected water was cut off, and a pure supply was run through the foul pipes, with the result that cases continued till the poison was gradually washed away. One more point of special interest and great importance is that about a month after the Lincoln epidemic began the people either imported water or boiled it, and yet the epidemic went on for four months longer. But even though water was "boiled," I think it is quite possible that infection by it may have occurred in several different ways, of which I give two:—

(1) To kill the *B. typhosus* it requires a temperature of 60° C. for thirty minutes, or 100° C. for two or three minutes (Muir and Ritchie). In a great many of the houses in Lincoln it would undoubtedly be taken for granted that water coming out fairly hot from the boiler would have been boiled and would be safe. Most boilers are so constructed that as hot water is drawn off, cold water flows in automatically. It follows, therefore, that polluted water

is always mixing with what is sterile, and as soon as the temperature gets near 60°, the water would be anything but sterile. These facts are entirely borne out by experiments made by me both in my laboratory and in my kitchen. In the laboratory I can boil about one and a half gallons in one and a half minutes, and yet when water was drawn off, in a very few minutes the temperature fell to 60° C., with the gas on full, and to 30° C. with the gas half on. In the kitchen, with the fire burning all day, the tap-water varies between 40° and 65° C., and to get really hot water the fire has to be kept banked up. With the small boilers supplied in cottages there can be no doubt that contamination was possible in this way. In my own house it would be impossible to get a continuous supply of sterile water from the boiler unless very special trouble was taken.

(2) Water at 60° C. is too hot for the hands, and would need cold, and therefore polluted, water to be added to make it possible to use it, so that milk stored in a vessel washed in such water would at once become contaminated.

The application of the above facts will explain the statements that epidemics have continued after boiled water has been used. Thus, in the Dongola Expedition of 1896, cholera, almost certainly a water-borne disease and enteric fever continued, although all water was boiled and put into vessels to cool; but it is not stated whether those vessels were also sterile first. I must confess I have never seen vessels for storing water sterilised first either in Burma, India, or South Africa. Again, in Munson's "Hygiene," it is stated that troops at Jacksonville, Lexington and Knoxville used the same water supply as the civil population, and yet the military had typhoid while the civilians had none. At once one asks, was the water piped to the military camp or was it carried in infected water-carts? What was the water stored in in camp? Unless these questions are answered satisfactorily, there is no proof that water was not the cause.

This theory also accounts for the varied incidence of the disease in India. Even when a piped supply is used the water must be stored to cool, and if there are 200 storing vessels in a cantonment there are 200 different kinds of water supply, according to the state of the lining wall of each vessel, and a vessel once polluted may remain so for some time. That storage vessels may remain foul is demonstrated by the following provisional experiments made in my laboratory:—

Water was obtained from the Ouse below the city of York, and placed in a regulation water-bottle and a Burmese earthenware

"chatty," both having been previously sterilised. After twenty-four hours 2 cc. of water were taken from each, and mixed with corresponding portions of bile salt broth. The original was then poured out, and the bottle and "chatty" filled with sterilised water, shaken up, and 10 cc. from each mixed with 10 cc. of bile salt broth. The remaining water was then poured away and fresh sterilised water put in, and samples (10 cc.) were taken after the second and third washings in like manner.

After twenty-four hours' incubation, both the original water and each of the three washings had become acid with the formation of gas; that is to say, a sterilised bottle and "chatty" polluted with organisms producing acid and gas still retained them after three washings with sterile water.

These experiments I consider a severe test, for various reasons, one of which is that the chief source of pollution of a water-bottle or "chatty" is the slime that collects on the walls in course of time. In twenty-four hours this slime had formed to only a slight extent in the sterilised bottle and new "chatty," and yet three washings of each still remained impure.

Enteric Fever in Large Towns.—The small amount of enteric fever in the large towns of England is very significant.

	Town	Population	Rate per 1,000
1904	Manchester	558,000	0·58
,,	Leeds	450,000	0·79
,,	Halifax	103,000	0·45
,,	Warrington	68,000	0·29
,,	York	80,000	1·11
1903	British troops in India ..	69,000	19·6

Some of these towns are densely populated. Halifax has the Goux closet system, Leeds has 5,000 privy middens, Warrington is almost entirely a pail-closet town, York has its share of privy middens and slums. It is impossible to compare the sanitation of an Indian barrack with that of a slum of a large English town to the advantage of the latter, so that the great fact stands out once more that, given a good water supply, insanitation is of little importance as a causation of enteric fever. It is interesting to compare Warrington with York as regards their typhoid fever and water supply.

Town	Population	1900	1901	1902	1903	1904
Warrington ..	68,000	62	32	32	22	20
York	80,000	244	121	56	47	89

Warrington was once noted for the prevalence of enteric fever, but with a change in water supply the disease at once diminished. York draws its water from the River Ouse, which receives the sewage of Northallerton and Thirsk among other impurities, and it is filtered on the Jewell system. Typhoid in York is not put down to water, but it is curious that a few days ago I found *B. coli* in 10 cc. of water from a tap in my laboratory, and a short time afterwards the blood of one or two cases of diarrhœa clumped slightly (*sic*) with a culture of *B. typhosus*.

Personal Infection.—In all the Asylums Board hospitals in London 127 nurses were infected in eight years, an average of about sixteen a year. Considering how enteric cases are mixed with others owing to the difficulty of diagnosis and other reasons, and how very seldom another patient contracts the disease, it is hard to believe that personal infection has any importance in the spread of it, except, of course, for nurses. In military hospitals in England infection from patients to nurses counts for 2·6 per cent. of all enteric admissions, which works out at 1 in 50,000 for the Home Army per year.

Presidency Towns in India.—The three Presidency towns in India have all got piped water supplies, presumably of good quality. If the slums of a large city in England are insanitary, how much more so are those of a large Indian town. Yet Fort William, Bombay and Madras are not noted for typhoid. As a matter of fact, the figures for the Presidency districts are about 15 per 1,000, lower than the average for India. Concerning Agra, in the Army Medical Department Reports for 1902, it was noted that while in 1897 there were 181 cases of enteric fever, in 1902 there were only four, great improvements having been made in sanitary matters, chiefly in connection with the water supply.

Ashanti Campaign of December, 1896, *to February*, 1897.—No recent campaign has given better results than the above under Sir W. Taylor as Principal Medical Officer, although it occurred in so unhealthy a part of the world as the West Coast of Africa.

Ashanti, December, 1896, *to February*, 1897.

Per 1,000	Admissions for disease	49·27
	Deaths from disease	0·56

Compare this with the worst results obtained in late years.

Dongola, 1896.

Per 1,000	Admissions for disease	976
	Deaths from disease	81·7

South Africa, 1899-1902.

Per 1,000	Admissions for disease	746
	Deaths from disease	69·00

Several precautions were taken in the Ashanti campaign, but amongst others may be noted :—

(1) "The first principle impressed upon all was to avoid doubtful water.

(2) "Not only companies and sections, but individuals, were looked after by officers personally, who saw that each man drank no water that had not been boiled."

It is significant that in Sir W. Taylor's Report the words "cholera," and "enteric fever," are not even mentioned.

The Nile Barage Works.—At Assouan, these works were occupied by an average of 923 Europeans and 5,463 natives for twenty months, and special care was taken to supply pure water. The camp was said to be swarming with flies, and dust-storms were frequent. Nine cases of enteric fever, all imported, occurred, but no death. In the Army Medical Department Report, 1896, on the Dongola Expedition, it is stated : "Considering that enteric fever is always present everywhere in the Soudan, and that the natives themselves suffer from it, and, I believe, die to a greater extent than Europeans, and foul their water supply, it is not to be wondered at that enteric fever is so common among British troops." Under these circumstances the freedom of such a large camp of Europeans and natives as at Assouan is truly remarkable.

Enteric Fever in Foreign Stations.—Can water be excluded?

South Africa.—In the report on the prevalence of this disease in Pietermaritzburg it is stated: "One is then justified in saying that the surroundings of the water supply warrant the gravest suspicions as to its purity."

During the South African War the water was notoriously bad, and attempts at sterilisation admittedly incomplete.

India.—In the last Army Medical Department Report (1903), the following general statement is made : "The drinking water in Indian cantonments will probably always require to be boiled unless some form of mechanical filtration is introduced." In the Army Medical Department Report for 1902, a description of the "so-called prophylaxis" by boiling of water in the various stations in India is given. I regret to say it quite tallies with my experience, and there is no doubt that the system is not thorough enough to be an absolute preventive. A little further on it is said that the water, at, amongst other places, Mhow, Ahmednagar and Umballa,

all noted for the frequent recurrence of enteric fever, is liable to contamination.

In 1903 Umballa had 107 admissions. "All water was boiled, but utensils for distribution were not sterilised."

At Meerut, with 100 admissions, boiled water was stored in "gurrahs," but whether these were sterilised is not stated.

The station where there is the greatest difficulty in excluding water as the cause is Quetta, where the water comes from a dam in an uninhabited region and is distributed in pipes.

In 1898, 232 cases were attributed to fæcal filth from filth-pits, but in 1899, when the site of these trenches was sown over and cropped, 26 cases occurred. In 1900 there were 129 admissions. The barracks are noted as models of tidiness and cleanliness, but the epidemic is attributed to native latrines. In 1901 there were 30 cases; in 1902, 77, and in 1903, 44 admissions. That native latrines should give rise to such virulent outbreaks at Quetta and yet have no harmful effects in many other places seems to be very improbable. Considering the perfect sanitation that appears to prevail there and the virulence and recurring nature of the epidemics, I think water must be the cause, although this is against that of so great an authority as Lieutenant-Colonel Davies. The recurrence of the disease, after the offending filth-pits were covered over, shows that they were not the cause.

I have made inquiries about Quetta, from an officer who was there in 1902, and from him I learn that the source of the water is isolated, and that the pipes lead direct to the different barracks and kitchens; on the other hand, water running in open channels through the cantonment is liable to pollution; also that in the barrack-rooms water is stored in small earthenware vessels.

Dr. Thresh, in his book already quoted, states: "To inspect a stream for pollution, every tributary, drain, and ditch should be noted carefully, as well as the extent and character of the area liable to flood." Can Quetta stand that test, considering the habits of the natives? Or is it possible that the earthenware storage vessels, for the sterilisation of which, I understand, there was no general order, had become polluted, either by the tap-water, or by the water in the cantonment channels? If enteric fever in Quetta is not due to water, I think sanitation may be given up as useless as a preventive of that disease.

Turning to Ceylon, can water be excluded as the cause in the camp of the Boer prisoners at Dyatalawa (Army Medical Department Report, 1900)? Six hundred cases occurred amongst a group of 5,028 prisoners. The epidemic started and subsided with the

rains, and it is stated to have been imported from South Africa, where the disease had been rife amongst the Boer forces, and in the ports where the transports put in. If this is so, it seems curious that the fever did not start among the prisoners of the first three ships. The first case was admitted fourteen days after the arrival of a man from the fourth ship in camp, and the stage of the illness was "probably of ten or more days' duration." The minimum periods of incubation laid down are—five days by Davies, four or five days by Fagge and Pye-Smith, a few days by Notter and Firth; it is not impossible, then, that the disease was contracted in Ceylon. As the water was piped from an isolated spot three miles distant, could it have been the cause? I think, from the Report as it stands, that it is not impossible. Having known that part of the country, on reading the Report two things at once struck me:—

(1) A stream in the hills, that in one place appeared to be an isolated mountain torrent, came out at another close to the high road on a plateau, and was likely to be polluted both by natives and by flooding of the surrounding area.

(2) This part of Ceylon is partially covered by tea estates, on which hundreds of coolies work.

If, then, remembering the rules for inspecting water supplies, the stream, or any of its tributaries, that supplied the Boer camp, was ever liable to pollution in either of these two ways (and it must be remembered that the epidemic began with the rains), water cannot be excluded as a cause of the outbreak. As regards the cases in the military camp, the water used was the same, except that it was put through Pasteur and Berkefeld filters. If the supply was impure, as I have suggested, it only bears out the fact that the order given in South Africa for the candles of the Berkefeld filters to be boiled twice a week was a very necessary one.

To sum up, the positive evidence that we have as regards the spread of enteric fever is that the infection may be due to milk polluted by water, to polluted water, and, to a slight extent, by those nursing or in intimate contact with the sick. It is theoretically possible that infection may be by dust and flies and by direct transmission from ambulant cases, but in large towns with good water supplies, where ideal conditions exist for infection in this manner, experiences teaches that their effect is slight. Moreover, in milk epidemics where the infection can be definitely checked in these ways, it is practically *nil*. In England, we have good, though not by any means necessarily perfect, water supplies,

the attack rate averages 1·3 per 1,000; in India it is admitted that no water can be trusted, and the average attack rate is 22·6 per 1,000. That cholera has been stamped out, while enteric increases, only proves, I think, that the poison of the latter is more diffused. In Quetta, where it has been taken for granted that the water supply is pure, measures taken on other lines have had little effect. The study of water epidemics shows that water-pipes or storage vessels once polluted may remain so for months, and that the incidence may be very varied, depending probably on the strength of the pollution of the water and on the number of storage vessels poisoned; and also that the measures taken for boiling must be very complete before success can be expected, and must include the sterilisation of storage vessels. Admissions due to infection while nursing, amount to about 1 in 50,000 British troops per year, and the dangers of milk are so well known that infection by its means must be quite inappreciable. The great fact then remains that water must be the chief and almost sole source of infection. If this be so, methods, other than those in respect of supplying pure water, now being employed in India, can have but a remote effect in prevention. Possibly they hamper, and if they do it is a curious anomaly that they should be due to the result of good work done by three of the best sanitarians in the Army. Moreover, if water be the sole cause of enteric fever, lecturing to officers and men on hygiene becomes quite simple. The four great diseases of the Army and the methods for their prevention on active service can be put in very few words. Thus, for malaria mosquito nets, for cholera and enteric fever pure water, and for dysentery pure water and the avoidance of chill. Remembering that it is a safe rule to trust no water in South Africa or India, to organise a system to supply pure water to the troops seems to me to be the most urgent want we have. Difficulties there may be, but it is not for the medical officer to make them; let those who refuse to follow our recommendations take the responsibility. Finally, no system for supplying pure water is complete that does not include arrangements for sterilising water-bottles. Once filled with impure water, those of the present pattern remain polluted, and sterile water added would soon be worse than ordinary water. The remedy is a metal water-bottle which can be put on the fire without being injured, and this would make small detachments quite independent of transport, as fuel, even in South Africa, is somehow found by the men. Water to replace water is the physiological necessity, its temperature being quite immaterial.

REPORT ON THE INVESTIGATIONS CARRIED OUT TO DETERMINE THE PRESENCE OR ABSENCE OF FILARIA AMONG THE TROOPS IN JAMAICA.

By Captain C. F. WANHILL.
Royal Army Medical Corps.

1st West India Regiment.—Owing to the fact that the disease was reported to be very prevalent among the men belonging to the detachment of this battalion stationed in Barbados, the first part of the investigation was carried out among the men stationed in Jamaica.

Procedure.—Twenty men were selected from the companies which were proceeding to the West Coast of Africa, making a total of eighty men examined. Of these, forty were examined at 10 a.m., and the remaining forty at 10 p.m. Thick films of blood were taken in each case, and the examination was made on the spot for the living filaria. In no case were parasites found. A few slides, as controls, were allowed to dry, and were then stained, the hæmoglobin having been first washed out with Leishman's stain and weak carbol fuchsin. Nine recruits, who had recently been recruited in Barbados, and who had only been three months away from that island, were examined by day and by night. No parasites were found.

Reason for Thick Film Method.—The method of using thick films of fresh blood, and depending on the movements of the filaria to discover its presence, was determined upon, on account of the ease with which the *Filaria immitis* is detected in the dogs of the island by this method. It is found that the filaria continues to move about on the slide till the blood coagulates, leaving trails where it has pushed the corpuscles aside. When the blood is freshly drawn, the corpuscles are pushed all over the place, and the briefest search, with the two-thirds objective, will detect the presence of the filaria.

General Examination.—Further information was obtained from blood slides examined for malaria. Some hundreds of slides were looked over for this parasite, including many forwarded by the civil practitioners of the island, in connection with the investigation of the local fevers, and, taking into consideration the care required by, and the high power used in, such an examination, any filaria present should have been easily detected.

Case of Filaria Infection.—In only one case was there any evidence of filaria found. The patient was a gunner in the Jamaica Company, Royal Garrison Artillery, and was, at the time, in hospital with malarial fever at Port Royal. His blood contained crescents, but at the time of the examination was free from active malaria. There were some ten filaria found in the slide of blood, and attention was first called to them by the finding of an empty sheath, but their characters were so hidden by the stain as to make it impossible to classify them. The gunner was a native of St. Elizabeth, Jamaica, but was almost white. This being a rare case, he at once became an object of interest, and his blood was frequently examined, but no further filaria were found. This may be accounted for by the fact that he had a series of malarial attacks, immediately after the discovery of the filaria, and the coincidence allows a theory with regard to the disease which may have some points to recommend it.

Theory of the Absence of the Disease from Jamaica.—It is possible that the poison, liberated in the blood on the formation of the malarial spores, is a deterrent to the filaria, and that they disappear during an attack of the disease, or it may be that quinine has some effect on the disease, or even that the high temperature can kill them. It is well known that there is no malarial fever in Barbados, though there is a great deal of filaria; while in Jamaica, although *Culex fatigans* and the Anopheles are present in swarms, filaria is comparatively unknown, while malaria is rife in many of the districts.

Experiments.—It is regretted that no permanent case with filaria was found, or experiments might have been made to determine why the disease, which must have been imported over and over again from Africa and the other West Indian islands, has not survived in the island.

Enquiries made among the Local Medical Officers.—Owing to the unsatisfactory results obtained by personal observation, enquiries were made among the local medical officers, who must have examined thousands of blood smears during their residence in the island.

Dr. Grabham, who is a recognised authority on malaria and mosquitoes in Jamaica, states that he has never seen a case of filaria infection, and that he collected 400 slides from different patients, at the request of Dr. Mott, of the Liverpool School of Tropical Medicine, which he forwarded to England. No parasites were found by Dr. Mott.

Doctors Turton and Niesh, District Medical Officers, both state they have never come across filaria in human blood. Dr. Grabham has examined the blood in some cases of elephantiasis, but has found no parasites.

Civil Reports.—The annual reports of the Civil Government Medical Service contain only the heading "Parasites," making it impossible to trace the species. There are very few cases mentioned, and there is no mention, in the medical transactions, of filarial infection for the last five years, so that it is presumed that the disease is rare in the island. The reason given for one or two amputations is elephantiasis, but as leprosy is very prevalent, the presumption is that the real cause was elephantiasis græcorum.

Conclusion.—From the information collected above it may be fairly deduced that—

(*a*) Although the majority of the dogs of the island are infected with *Filaria immitis*, human filariasis is comparatively unknown.

(*b*) Although, since the slave days, the disease must have been continually introduced into the island, there are some local factors which are against the successful development of the parasite in the human body.

(*c*) The factor may be the malarial poison, which must be present in most of the native population at some period of their lives. Dogs do not suffer from malaria, and their universal infection with filaria may be thus accounted for.

(*d*) The disease is, at present, so rare that no precautions are indicated as yet.

THE "PASTEUR INSTITUTE" AT THE GERMAN FIELD HOSPITAL, TIENTSIN.

By Lieutenant-Colonel W. G. MACPHERSON, C.M.G.
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During the Boxer troubles in 1900-01, a case of death from rabies occurred in the German Expeditionary Force, and it was therefore decided that, should any other member of the force get bitten by a mad dog, he should have the benefit of Pasteur's prophylactic treatment. Treatment was accordingly carried out in the Pasteur Institute attached to the General Hospital in Shanghai; and, until the spring of 1903, sixteen cases were treated there.

When the German troops evacuated Shanghai there was some difficulty in transferring cases from Tientsin for treatment there, and it was decided to establish a Pasteur Institute in connection with the German Field Hospital at Tientsin. Dr. Eckert, a young military medical officer, an *Oberarzt* of the field hospital establishment, was sent to Japan to study the method of preparing anti-rabic material under Professor Kitasato at Tokio. After his return from Japan the "Pasteur Institute" was established at Tientsin in accordance with his specifications.

A plan of the building is appended, showing the dimensions and uses of the three rooms which it contains. It is situated within the premises of the German Field Hospital, near the hut used as the bacteriological and chemical section of the hospital. It is built of local brick. The flooring and walls are constructed of good cement, also obtained locally, and the rooms are well lighted.

The kennels and hutches in rooms (1) and (2) (see plan) are also constructed in cement.

The "Institute" is under the sole charge of Dr. Eckert, assisted by a subordinate, a N.C.O. of the Army Medical Service. Dr. Eckert is also in charge of the bacteriological department of the Field Hospital, which, it may be mentioned incidentally, is equipped for 200 beds on a scale more similar to that of our General Hospital, than to that of a mobile field unit.

The procedure adopted by Dr. Eckert and the equipment of the "Institute" are very simple. In the first instance he obtained from Japan a "fixed virus"; that is to say, a virus obtained after 168 successive inoculations into guinea-pigs, generation after generation, from an original case of rabies. The resulting "virus"

gives constant results on being inoculated beneath the dura mater of the guinea-pig. The animal shows the first symptoms of illness, paralysis of the hind legs on the seventh day, and inoculations from the brain or cord of such an animal into another will cause exactly the same result. It is this "fixed virus" which Dr. Eckert uses in the treatment of his cases. He inoculates a guinea-pig with it. On the seventh day he takes the animal from the hutch, places it on the operation table in the preparation room (room 3), and kills it with chloroform vapour. The spinal column is then exposed by a rapid dissection with sterilised instruments, kept in trays of carbolic solution and wiped, as required, during the dissection, with pledgets of sterilised cotton-wool. The column is next cut across at the upper cervical and lower lumbar vertebræ, and the assistant then pushes the spinal cord out of the canal by inserting into the lumbar extremity a metal rod, the end of which is wrapped in cotton-wool, steeped in methylated spirit and set on fire; these precautions being taken merely with the object of maintaining asepsis. The cord comes out quite easily and intact at the cervical end of the canal, and, as it comes out, it is seized by the operating surgeon with a sterilised forceps and placed in a sterilised glass dish, where the ends are snipped off and the remainder divided into three or more portions by means of sterilised scissors. The ends are destroyed and the other portions hung on sterilised hooks inside a jar containing some pieces of caustic potash in order to be dried.

The operator then removes the brain of the guinea-pig, examines the original inoculation wound to see that it has healed, and that there has been no sepsis. He also examines the internal organs to see that the animal is healthy. The bladder should be found distended as a result of paralysis, and the suprarenal capsules congested. The lungs are also found congested from chloroform, but all the other organs should show no abnormalities. The dead animal is then burnt.

A small portion of the brain is mixed with some distilled water, by means of a sterilised pestle and mortar, and one drop of the mixture inoculated under the dura mater of a fresh guinea-pig. The guinea-pig is anæsthetised with a few drops of chloroform, the occipital bone exposed, the periosteum scraped off and about one-eighth square inch of bone chipped off with a small chisel, exposing the dura mater. The needle of the inoculating syringe is pushed into the subdural space, and the virus injected. The wound is then stitched up and dressed with iodoform collodion. The guinea-pig keeps quite well for seven days, then shows signs

of paralysis, is removed from its hutch, destroyed, and the cord extracted as already described. Virus is thus constantly maintained through successive guinea-pigs.

The treatment of the extracted cord is as follows: A small portion is placed in broth and incubated to test its sterility. In the event of its proving septic, the whole cord is destroyed, but if it is aseptic the portions placed in the drying jar are kept there and removed on the second, third, fourth, fifth, sixth, seventh and eighth day of drying. In practice only the second, fourth and fifth, and seventh and eighth day of drying are considered. The portions removed from the jar are placed in glycerine in test tubes, until required for use.

The number of days drying represents the potency of the virus for inoculation into man, in inverse proportion; an eighth day cord being less potent than a second day cord. Treatment consists of triturating 1 cm. of dried cord, according to the day of drying, in 5 c.cm. of distilled water, and inoculating 1 to 2 c.cm. of the mixture into the subcutaneous tissue of the back, one to three times daily for twenty-one days.

The general scheme of treatment and dosage is shown in the table appended.

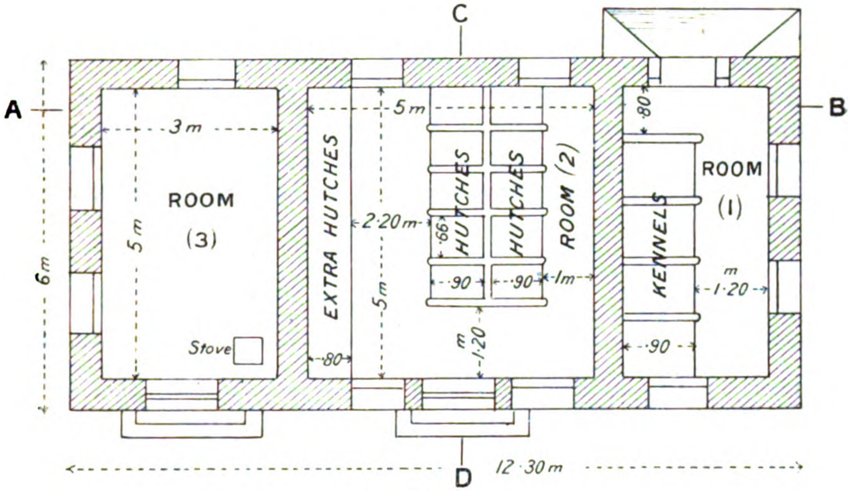
The furniture and equipment of the preparation room is simple and inexpensive.

Oberstabsarzt Dr. Kaether, the Senior Medical Officer of the German contingent in North China, to whose kindness and courtesy I am indebted for the appended plans and table, and for an opportunity of studying the procedure at the "Institute," has placed the Institute at the disposal of the other European troops in North China. At present there are two French soldiers under treatment. Their temperature charts show no disturbance of the general health, and the "virus," as prepared above, is stated to have no bad effects of any kind. The treatment is commenced as soon as possible after the individual has been bitten, delay lessening the potency of the prophylactic. The precautions to be attended to are: (1) Strict asepsis; (2) care not to inject into epidermis or muscle where there are many nerve endings and nerve tissue.

No doubt these notes describe well-known processes and facts, but they are made with a view to showing how simple a matter, after all, is the treatment of rabies, provided a small equipment, accommodation, and a competent operator with one assistant are available. Here we have a complete "Institute" in a Field Hospital, and it would be a simple matter to establish similar

PLANS OF THE PASTEUR INSTITUTE AT THE GERMAN FIELD HOSPITAL, TIENTSIN.

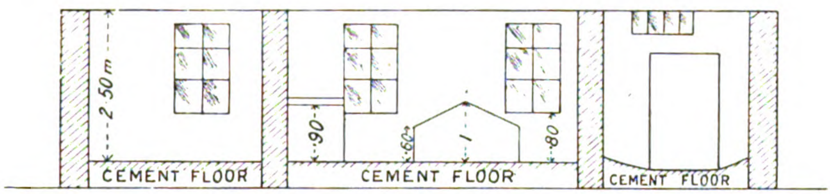
Scale, $\frac{1}{100}$.



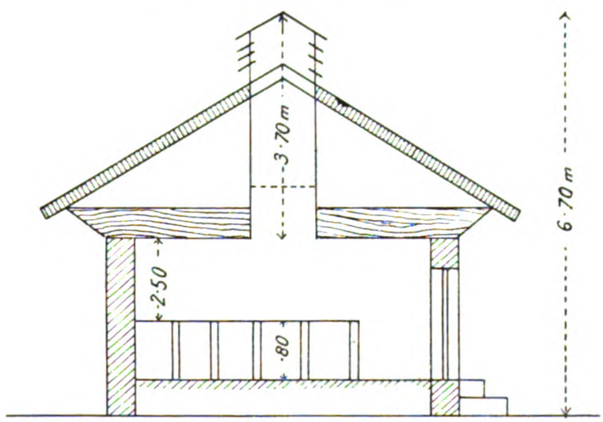
GROUND PLAN

Room 1.—Observation room, with kennels for dogs, supposed to have been mad, that have bitten patients under treatment. Room 2.—Room with hutches for inoculated guinea-pigs. Room 3.—Laboratory for preparing material for inoculation of patients.

Note.—The floors and walls of the rooms are rendered with cement.



LONGTITUDINAL SECTION A-B



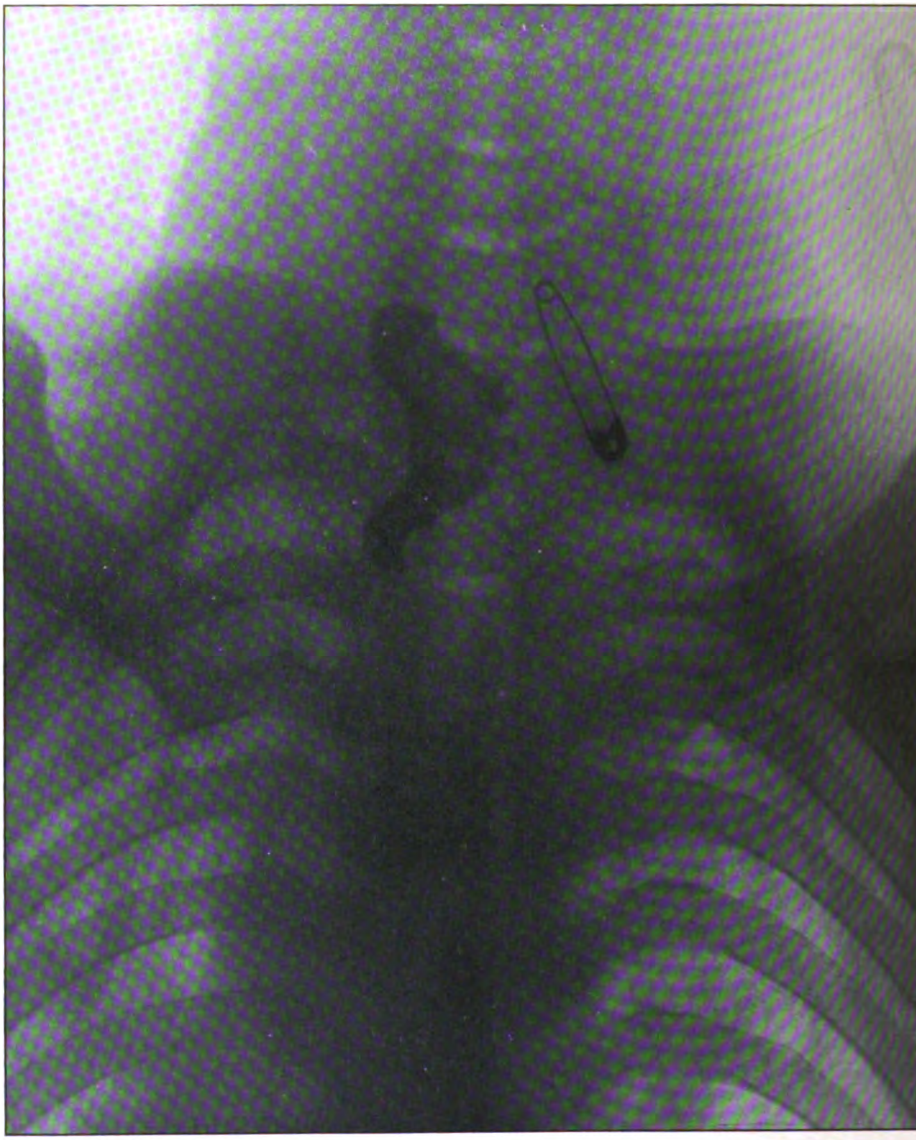
CROSS SECTION C-D

Institutes, in India for example, in various centres, instead of in one general centre, as at present in Kasauli.

In any case the general plan and scope of the German Field Hospital "Pasteur Institute" in Tientsin are worth noting, as a possible useful addition to General Hospitals at the base of military operations, in countries where soldiers are apt to be bitten by rabid animals.

TABLE SHOWING THE NUMBER OF INJECTIONS, THE AGE OF THE MATERIAL INJECTED, AND THE QUANTITY INJECTED ON EACH DAY OF TREATMENT FOR THE PREVENTION OF RABIES.

Day of treatment	Age of the spinal cord (*i.e.*, number of days during which it has been dried since removal from guinea-pig)	Quantity injected in each injection of the prepared material (*i.e.*, 1 cm. of spinal cord triturated in 5 c.cm. distilled water)
1	8 day cord, 7 day cord, 6 day cord	Three injections, each 1½ c.cm.
2	5 day cord, 4 day cord ..	Two ,, ,, 1½ ,,
3	4 ,, 3 ,, ..	Two injections, 4 days, 2 c.cm.; three days, 1 c.cm.
4	5 ,, 5 ,, ..	Two injections, each 1½ c.cm.
5	4 ,, 4 ,, ..	,, ,, ,, ,, ,,
6	3 ,, ...	One injection 1½ c.cm.
7	3 ,, ...	,, ,, 2 ,,
8	2 ,, ...	,, ,, 1 ,,
9	2 ,, ...	,, ,, 1 ,,
10	5 ,, ...	,, ,, 2 ,,
11	5 ,, ...	,, ,, 2 ,,
12	4 ,, ...	,, ,, 2 ,,
13	4 ,, ...	,, ,, 2 ,,
14	3 ,, ...	,, ,, 2 ,,
15	3 ,, ...	,, ,, 2 ,,
16	2 ,, ...	,, ,, 1 ,,
17	2 ,, ...	,, ,, 1 ,,
18	4 ,, ...	,, ,, 2 ,,
19	3 ,, ...	,, ,, 2 ,,
20	2 ,, ...	,, ,, 1½ ,,
21	2 ,, ...	,, ,, 2 ,,



To illustrate paper by Captain F. J. PALMER, R.A.M.C
"A Case of Œsophagotomy."

Clinical and other Notes.

A CASE OF ŒSOPHAGOTOMY.

By Captain F. J. PALMER.

Royal Army Medical Corps.

The rarity of this operation in Army surgery must be my only excuse for bringing it to notice in the pages of this Journal.

Corporal W. was admitted at the Royal Infirmary, Dublin, at 5 p.m., on December 4th, 1905, having swallowed his dental plate in his sleep some sixteen hours previously. Ineffectual attempts having been made to extract it with a probang, &c., at the Station Hospital, he was transferred to the Royal Infirmary. On admission his temperature was 100° F. There was a good deal of swelling of the lower part of the neck immediately above the manubrium sterni, most marked on the left side. Though the body could not be felt, there was a decided sense of fulness and resistance at this point, and pressure over the swelling caused him severe pain. Protective rigidity of all the neck muscles was noted. Patient was quite positive that the plate was stuck just above the sternum. There was no vomiting, and small sips of fluid could be swallowed, though doing so caused considerable pain.

Patient was prepared for operation, and two ounces of a saturated solution of magnesium sulphate ordered, to be taken in as large sips as he could conveniently swallow. He was given a little milk during the night, December 5th. This morning an excellent skiagraph taken by Lieutenant and Quartermaster F. Bruce showed the plate lying a little to the left of the median line with its lower border on a level with the manubrium sterni. Considering the nature of the body, the fact that attempts at extraction had already been made, that some fever existed, and that the body lay so low down that it could not be reached by forceps from the mouth, it was thought better to operate at once than to renew attempts at extraction which might only result in driving it to an inaccessible portion of the œsophagus. Under chloroform, an incision three and a half inches long was made about an inch internal to the anterior border of the left sterno-mastoid and more or less parallel with it. The incision was made a little further in than usual to avoid an oblique left anterior jugular vein which ran exactly in the usual line of incision. The deep fascia was opened over the sterno-hyoid and sterno-thyroid muscles which were retracted inwards, the sterno-mastoid and the unopened carotid sheath being drawn outwards. The anterior belly of the omo-hyoid was demonstrated above, but was not divided, though to gain a free exposure it was found necessary to divide transversely some of the outer fibres of the left

sterno-hyoid muscle. The recurrent laryngeal nerve was clearly seen, and the œsophagus demonstrated by exposure of its muscle fibre; within it could be felt the tooth plate. The inferior thyroid vessels could be seen in the floor of the wound. The larynx was carefully tilted and pulled over to the left side, and the œsophagus carefully freed by the finger for a short distance. An incision about an inch long was then made longitudinally over the upper pole of the plate, well behind the recurrent laryngeal nerve, and the edges of the slit grasped and held apart by Kocher's forceps. An artery forceps was then clipped on the upper pole of the plate, and it was extracted by gently rotating it round the centre of its arc so that its shortest diameter only engaged the slit. By this manœuvre the long incision recommended by some authorities was rendered unnecessary. The œsophageal wound was then closed by a continuous suture of fine chromic gut passing through the entire thickness of its wall, and this was in turn inverted by a suture of similar material passed Lembert-wise through its fascial and the outer layers of its muscular coat. The external wound was closed above and below by continuous sutures of silkworm gut, but about an inch of its centre was left unsutured, through which a drain of iodoform gauze was passed down to the wound in the œsophagus. On inspection, the plate was found to measure two and a half inches in length and to have one tooth upon it.

After operation, patient was only allowed teaspoonfuls of boiled water, with the double object of allaying thirst and keeping the inner aspect of the wound clean. Frequent gargling with weak cyllin lotion was carried out, and the neck rendered immobile by sandbags. In the evening the temperature was 99° F. Respirations 16. Pulse 84. No pain. At 9.15 p.m. a boiled No. 12 soft rubber catheter was passed down the œsophagus, and he was given eight ounces of milk poured into the attached funnel; before withdrawing the tube any milk remaining in it was washed away by filling the funnel with a little boiled water, and allowing it to run into the stomach. On withdrawal of the tube the mouth was again gargled with the cyllin lotion and a little of it swallowed to remove the last traces of milk from the gullet. This routine was adopted on each occasion when he was fed by the tube. A saline rectal injection of one pint was given later, and during the night morphia, ¼ grain, on account of restlessness.

December 6th.—Temperature in the morning 99·4° F. Very comfortable, little or no pain. Sixteen ounces of milk given by tube. Dressed. Some redness of edges of wound, and on removal of the gauze drain it had a foul odour. Wound most carefully cleansed with peroxide, and replugged with iodoform gauze soaked in weak cyllin lotion. Evening temperature 100·8° F. At 5.30 in the afternoon, sixteen ounces of milk were given by the tube, and at 11.30 another ten ounces.

December 7th.—Suppuration now established and gauze plug soaked with stinking pus. Saturated solution of magnesium sulphate given the

previous evening produced a good effect. In the morning ten ounces of milk were given by the tube, and in the evening a pint. Morning temperature 100·8° F., evening 100·2° F. Very comfortable. Little or no pain. Frequent cyllin gargles.

December 8th.—Dressed twice. Comfortable, though wound flooded with stinking pus. Cyllin lotion and peroxide used for cleansing wound. A pint of milk given morning and evening by tube. Frequent cyllin gargles.

December 9th.—Slight leaking of œsophageal slit with appearance of a small quantity of milk in wound after feeding. Small quantities of cyllin lotion swallowed to clean depths of wound. Temperature, morning 99·4° F., evening 99·8° F. Dressed after morning and evening feed. Allowed to pass tube himself, which he does most skilfully.

December 10th.—Temperature dropping. Dressed thrice daily. Pus very foul. Skin sutures removed as a point of pus in every track. No pain. Sleeps well.

December 11th.—Still improving. Dressed four times in twenty-four hours.

December 12th.—Morning temperature reached normal. Four dressings in twenty-four hours. A good deal of fluid on swallowing appears in wound.

December 13th.—Dressed six times in twenty-four hours. Pus less foul. Ends of incision healing rapidly.

December 16th.—Morning temperature subnormal, evening normal. Dressed six times. A small slough, probably of the edge of the œsophageal incision, with embedded chromic gut suture came away. Very little fluid now comes through the wound on swallowing.

December 17th.—Fœtor of wound has disappeared. Fistula closed to-day.

December 18th.—Allowed a little thin arrowroot by mouth to-day. Tube feeding discontinued. Dressed four times.

December 19th.—Dressed twice. Wound rapidly closing.

December 20th.—Dressed once only. Scarcely any discharge. Allowed up two hours.

December 23rd.—Up all day. Allowed oatmeal porridge.

December 25th.—Minced chicken diet.

December 30th.—Discharged to-day. Wound healed.

Comments.

It is usually recommended that in these cases only rectal feeding should be followed for two days, and that only at the end of that period should tube feeding be commenced. In this case tube feeding was commenced on the evening of operation, for the following reasons: We have in the œsophagus, unlike the bowel, no muscular tube covered by a membrane possessing adhesive properties of so pronounced a character,

that if partially immobilised for a short time in contact with similar tissue, firm union will take place between the two opposed surfaces.

The healing of an œsophageal wound is of a much slower description. Like an intestinal wound, an œsophageal one is septic from its making; unlike it, its exterior is not bathed in a fluid of such markedly phagocytic character as the peritoneal exudation. For these reasons the wound will in all probability become septic by infection from its depths, no matter what precautions may be taken in making the external wound, in which case healing must take place by secondary union of granulations and be necessarily slow. Why weaken the patient by denying him anything but rectal nourishment for the first couple of days? To be effective, the rest of the œsophagus should extend over a much longer period. Should a septic union take place a certain amount of union would take place in that time, but such an event is unlikely. The passage of a tube is supposed to disturb the parts and favour leakage from the œsophagus. The smooth rounded end of a soft rubber catheter cannot hitch at any point of a well-sutured wound, cannot from its small size distend the wounded tube unduly. The resistance which is felt when passing a tube through such a wounded portion is quite unlike the "grip" of a stricture. It is much more probable that in such a case the loss of the "carrying on" power of the œsophagus, due to its muscular contraction, is lost when the neighbourhood of the wounded portion is reached, and that the tube then only moves forward on pressure from above. The difference between the ease of its motion under the two conditions gives rise to a false impression of tightness. On these grounds I would submit that rectal feeding for some days in these cases is probably a useless precaution and productive of little good. The fœtor of the discharge from the wound in the case here recorded is scarcely an argument against early tube feeding, as it was due to a small slough of the edges of the wound, probably caused by strangulation of its edges by the double continuous suture employed, when the part became swollen by septic inflammation. Had ordinary catgut been used for suturing the œsophagus, its rapid softening under septic influences would have prevented such an occurrence taking place.

NASAL OBSTRUCTION IN ADULTS.

By Major G. A. MOORE.

Royal Army Medical Corps.

There are few affections of the nasal passages during the course of which the symptoms of obstruction are not complained of by the sufferer: whether the stenosis be due to hypertrophy of the turbinate bones, nasal polypi, irregular, abnormal, or deflected septa, or kindred causes, the symptoms are very similar.

In the Army, it is true, we do not come across many cases of nasal obstruction, but if met with, a very thorough treatment is imperative. The work demanded of the recruit or soldier, nowadays, is trying—early morning parades, doubling drill, manual exercises, gymnastics—all exert a very considerable strain on the different systems of men who, in the majority of cases, have not arrived at their full development, and in whose bones the process of ossification has not been completed; in such cases the evil consequences of nasal obstruction are soon apparent. The respiratory system is the first to be affected, the nostrils being no longer able to take in the amount of air necessary for the proper aeration of the blood, the mouth is called upon to act as the chief inspiratory agent; so far, not much harm has been done, but the air now entering the lungs is no longer warmed, or filtered, and coughing and other signs of pulmonary irritation present themselves; the extraordinary muscles of inspiration are called into use, and acting, as they do, on structures unfitted for such strain, distortions frequently result; thus, pigeon-breast may be brought about, or, again, herniæ. The mouth, from being so constantly used, tends to remain more and more open, the nostrils, largely relieved of their duties, become atrophied, and their openings narrow and slit-like; and so the condition is established—mouth-breathing, inspiration of cold and impure air, hurried and shallow inspirations, atrophied and collapsed nares. In such cases, and especially if exertion be taken, the circulatory system does not escape, the blood meeting in the lungs colder and more impure air, fails to take up the gases necessary for its proper renewal as quickly or as freely as under normal conditions, with a result that the heart-beat is quickened, and frequently palpitation results; if the strain be further continued, breathlessness, and a sense of suffocation, are experienced. Other symptoms suffered from in cases of pronounced nasal obstruction are many and varied; few patients escape recurrent attacks of acute, or subacute, rhinitis, a more exhausting complaint than which it is hard to conceive, with its frontal pain, sense of weight over the bridge of the nose, the constant and profuse watery discharge, the loss of smell, and perhaps painful ocular symptoms, one and all tending to make the patient thoroughly wretched and worn out.

As to treatment, no stereotyped rules can be laid down for these cases; in each the treatment to be carried out will depend on the exact anatomical, or pathological, conditions present. Thus, if obstruction be due to an overgrowth of an intranasal structure, *e.g.*, a hypertrophied turbinate bone, this must be reduced in size or removed, and for this the use of the galvano-cautery will be probably sufficient, repeated applications being made, if necessary. If the obstruction is still larger, partial division with a strong scissors, or turbinotome, the removal of the bone being completed by a strong snare, will be the best procedure. Finally, if a more radical treatment seems imperatively indicated (as in Case IV.), a free removal by the nasal spokeshave gives excellent results. In this proceeding the

hæmorrhage, as a rule, is very free; if, however, full attention has been paid to antiseptic precautions, and the nostril is plugged immediately with well-oiled gauze, this need not cause alarm. Should the obstruction result from causes such as polypi, cysts, tumours, foreign bodies, these must be dealt with by snaring, curetting, cauterisation; if the septum be at fault, whether from spurs, exostoses, deviations or other abnormalities, these should be removed, or corrected, the greatest care, of course, being taken to avoid actual damage to the septum itself. The aim in all these cases is "Nature's nasal air-way must be re-established," and the almost certainty of being able to attain this result will justify some risk being run. The relief experienced by patients who for months or years have been deprived of the power of breathing freely through one or both nostrils, is incalculable, and one is well rewarded by the feelings of gratitude such patients express.

To have even a slight idea of the discomfort of nasal obstruction, let one tightly pack one of his nostrils with gauze for a quarter of an hour, and try to carry on his ordinary work, or to run, or do gymnastics; he will very soon begin to experience some of the disagreeable symptoms touched on above, and will be glad to discontinue the experiment. The following cases met with in the last few months are good illustrations of the disabilities and discomforts arising in cases of nasal obstruction. An account of some measures taken for their remedy is also attached.

Case I.—Boy B., Gloucester Regiment, came to hospital suffering from considerable swelling and great pain over the upper part of the bridge of the nose, of constant headaches and frequent attacks of a copious watery discharge from the nose. His chief complaint, however, was that for the last eight years he had been unable to breathe at all freely through the right nostril, and that he felt unable to do his drills, doubling, gymnastics, &c., as he found the greatest difficulty in getting his breath. The men in his barrack-room complained that he woke them nightly by his loud snoring. The boy was very anæmic, somewhat vacant in manner, and a little deaf. I found that on both sides the inferior turbinate bones were large, but not sufficiently so to obstruct the air current. The right middle turbinate bone was immensely enlarged and inflamed, even touching the septum, and almost blocking up the whole air-way on that side.

The respiratory utility of the right nostril was about one-eighth of normal.

In the post-nasal space I found a small central pad of adenoids.

The case was watched for some days, light, unstimulating diet, soothing nose-washes, and aperients were given, and much of the inflammatory condition subsided; the obstruction, however, in the right nostril, and the pain over the bridge of the nose still continuing, on June 18th I again examined the turbinate, and found that it was permanently enlarged and hypertrophied, and accounted for the obstruction which existed. Under cocaine 15 per cent. and adrenal 1 in 1,000 (equal parts) and using Heath's

curved scissors, I divided a large portion of the right middle turbinate from below upwards, completing its removal with a snare. Hæmorrhage was very free, but controlled by tightly packing the nostril with oiled iodoform gauze, which was left in for thirty-six hours. For the first six hours the boy suffered a good deal of pain, and the evening temperature was 100° F.

On June 20th I removed all dressings. He said he had slept well and felt no pain, and the men in his ward informed me that he had not snored.

Convalescence was uninterrupted, the nostril was washed out twice daily with warm alkaline lotion, and the *débris* of bone came away. He left hospital on June 24th.

On July 26th I saw Boy B. He had been at duty some weeks, and stated he felt much improved in health and better able to do his work than he had ever been; that he could now breathe freely and never snored, nor had to fall out on parade; that the continual frontal pain had quite left him, and he had no discharge from the nose since the operation. The anterior cut surface of the turbinate was healed, and the respiratory utility of the right nostril was now seven-eighths of normal and will further improve. He sails for India in a few weeks.

Case II.—Private L., Essex Regiment, came to consult me about his nose, complaining that by his snoring the men in his room were kept awake, and, as a consequence, his life was somewhat uncomfortable. He said that for years he had breathed atmost entirely through his mouth, as his left nostril was so "blocked up"; he suffered also from constant headaches and frontal pain. He was anxious to serve on in the Army, but was constantly being checked by his superiors, and had even to fall out on parades and at gymnastics, as he was so "short in the breath."

On examination I found the patient very anæmic, the nares narrow and slit-like; the respiratory utility of the right nostril was about one-third of normal, that of the left about one-fifth.

The middle turbinate bones on both sides were much enlarged. The post-nasal space was narrow and contracted and traces of old adenoids were noticed.

On June 18th, under local anæsthesia of cocaine and adrenal, I found that the condition of affairs was much as described in Case No. 1, viz., a very large left middle turbinate bone pressing (when inflamed) on the septum, and causing almost complete obstruction of the nasal air-way.

Using Heath's curved scissors, I passed one blade above and one under the lower surface of the left middle turbinate, as far back as possible, and divided it from below upwards, completing the removal with a strong snare. The nostril was packed with gauze and the after-care of the case was similar to that in Case No. 1.

The patient felt pain for six hours after the operation; all snoring ceased, and he soon returned to duty.

July 24th.—Private L. has been at duty for some weeks. He has greatly improved in colour, has gained weight, and there is no discharge

from the nose. He stated he could now do all parades with ease, and never felt so well in his life. He has ceased snoring and has had no headache or frontal pain since the operation.

Respiration through the left nostril is now normal.

Case III.—Private R., Essex Regiment, was admitted to hospital on March 10th. While still under three months' service he had been noticed by the Inspector of Recruits as unlikely to be ever fitted for the duties of a soldier on account of his defective respiratory capacities. His nares were narrow and slit-like, his colour white, and he became breathless on the least exertion. On examination, I found that his nasal obstruction was almost entirely caused by the presence in the right nostril of an enormous inferior turbinate bone which, projecting inwards, almost touched the septum, and interfered with the inspiratory nasal air current. In consequence, he had in a great measure become a "mouth-breather," and snored greatly at night. The patient begged not to be put out of the regiment, in which his father had been Sergeant-Major, and his brothers were now serving. I proposed operation, and on March 20th, under chloroform, using Heath's curved scissors, I divided the anterior one-third of the right inferior turbinate bone, and completed its removal with a snare. I packed the nostril carefully with iodoform gauze; at the same time I removed a large pad of adenoids. The case did well, and the patient was seen a few weeks later by the Inspector of Recruits, who was entirely satisfied with his altered appearance and respiratory capabilities. This man has gained in weight, and leaves shortly to join his regiment in India.

Case IV.—Private S., Middlesex Regiment, was sent from Mill Hill, complaining that he was unable "to double," or to do his parades and gymnastics, owing to inability to breathe through his right nostril; also of constant frontal pain and a sense of oppression on exertion. He stated that for years he has been troubled by this difficulty in breathing through his nose, but that now matters were worse than ever. He had no desire to leave the Army, and begged for any operation likely to benefit him.

On examining the nose, I found the septum deflected towards the right and much thickened, the right inferior turbinate bone was enormously enlarged and nearly touched the septum, almost entirely obstructing the air current in the right nostril; on the left side the inferior turbinate was also enlarged and obstructed the air-way to an extent of about one-third.

The post-nasal space was normal. Under local anæsthesia, cocaine 20 per cent. and adrenal 1 in 1,000, I thoroughly explored the right nostril, and found the obstruction to be entirely due to hypertrophy, and permanent enlargement of the anterior two-thirds of the right inferior turbinate bone. Under chloroform, I inserted the largest size nasal spokeshave, and passing it well back to about the centre of the bone, drew it quickly forward, removing, by doing so, a large piece, about two inches, of the inner surface of the middle and anterior portions of the bone. Free

hæmorrhage followed, but was controlled by plugging with gauze. For some hours the patient had a good deal of pain. After four days dressings were not required, and the nostrils were irrigated with warm alkaline lotions. The patient was placed on generous diet and suitable tonics.

July 23rd.—I examined Private S. to-day, three weeks after the operation. He seems better in every way, is of a much better colour, and says he eats and sleeps splendidly. The raw surface of the inferior turbinate has healed over and no crusts have formed. He says he feels better than he has done for years, and can now do his parades with ease and without effort; that he sleeps without snoring, and has had no frontal pain. Nasal respiratory capacity in the right nostril is now normal. He has been taught to wash out his nostrils with alkaline lotion.

A CASE OF CEREBRO-SPINAL FEVER.

By Lieutenant-Colonel N. C. FERGUSON, C.M.G.

Royal Army Medical Corps.

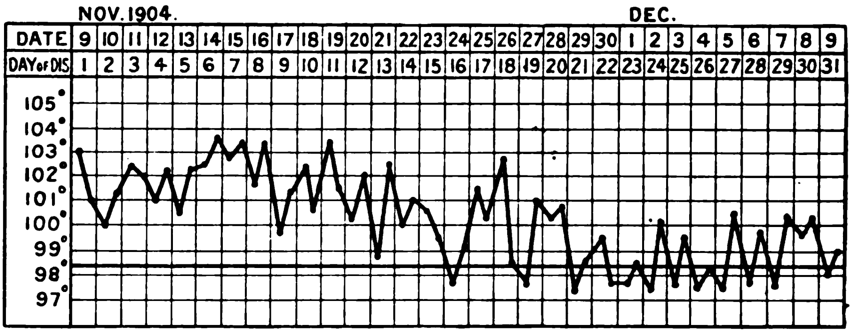
This was a case of sporadic cerebro-spinal fever of the chronic type, and was under my direct personal observation throughout (ninety days). It occurred in the person of a trooper of the 4th Dragoon Guards, of five years' service, two and a half of which were spent in India.

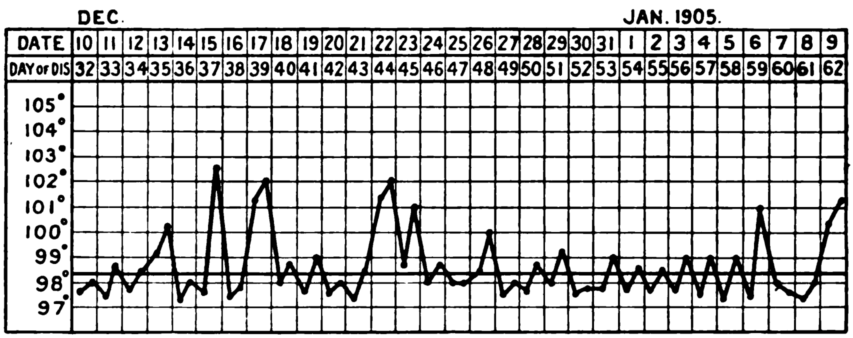
Diagnosis.—The case was very characteristic. Patient, who was in rude health, was suddenly attacked, while grooming his horse, with severe headache and vomiting. He had a history of having suffered from ague in India in September, 1903, and having had some attacks since, and the case was at first looked upon as one of malarial origin. A few hours later the extreme restlessness, severe headache, and pains in the back, with the appearance of a general erythema, suggested the onset of one of the acute specific fevers, and a petechial rash over arms and legs on the fourth day recalled somewhat the appearance of typhus fever. A few days' observation negatived the idea of this disease, and a probability of enteric was considered. Widal's reaction was not present, the tongue was perfectly clean and moist, and the only symptom of enteric present was the pyrexia. About the third week Kernig's sign was observed as being very well marked, and although lumbar puncture was performed three times with negative results, the subsequent onset of symptoms, and progress of the case, left no doubt as to its nature, and lumbar puncture on the sixty-ninth day showed *Diplococcus intracellularis* present in large numbers in the fluid extracted.

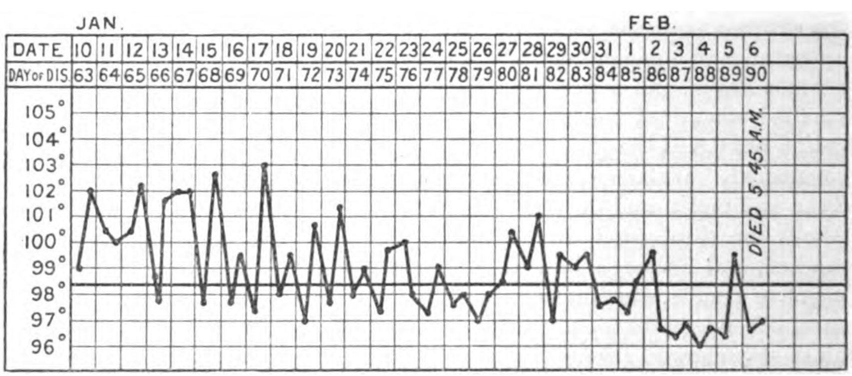
Symptoms.—The accompanying chart shows the course of the pyrexia, and the other symptoms noted were as follows:—

Nervous System.—Frontal headache of the most terrible severity was the leading symptom in the earlier days. It was accompanied by great

restlessness, stiffness, and pains in the back. It continued with decreasing frequency of attack up to the twenty-second day, and it is interesting to note that at this period vomiting and delirium were first observed (the







vomiting that marked the onset disappeared after the first twenty-four hours). This vomiting, which was cerebral in character, was a prominent symptom during the six weeks, and rendered the retention of sufficient nourishment difficult. On the thirty-third day he had two attacks of

convulsions, which were extensor in character and resembled those of tetanus, lasting about fifteen minutes, and were followed by unconsciousness for half an hour. These convulsions were repeated on the thirty-sixth, forty-second, forty-sixth, and fiftieth days, and during the intervals he had attacks of twitching which looked like incomplete convulsive seizures. These attacks ceased after the sixtieth day. Cheyne-Stokes respiration was observed for about two hours on the fifty-ninth and sixtieth days, and again on the seventy-eighth and seventy-ninth days. In the earlier period it was accompanied by a marked attack of muscular twitching, while this complication was absent later. The period of apnœa lasted about twenty seconds, and that of respiratory activity about forty seconds, during which there were about twelve respirations. Its onset was insidious, being preceded by dyspnœa and rhythmic irregularity of respiration, and it passed into the normal respiratory rhythm in a similar manner.

Physical Condition.—Generally, he was listless and apathetic. He could be aroused and sometimes became quite sensible, and again raving delirium supervened, in which he would repeat songs, speeches, and prayers. An interesting condition, of repeating for some minutes expressions which he had heard in the ward, was noticed. The delirium was not noted after the sixtieth day.

The Blood.—Several examinations were made and the marked leucocytosis was always observed, although with the instruments at my disposal an accurate estimate could not be made.

Skin Lesions.—Labial herpes was noticed between the twelfth and sixteenth days. The prodromal erythema was well marked, as was the petechial eruption, which lasted about a week. A bedsore commenced by a slight abrasion of skin over the sacrum on the thirty-fourth day. It gradually extended, in spite of the most careful nursing, to the size of a circle four inches in diameter, but remained superficial.

Respiratory System.—Up to the eightieth day this was normal; no coryza. The normal nasal mucus was examined for the Diplococcus with a negative result. On this day the breathing became hurried, and signs of consolidation of lower lobe of right lung were noticed. These signs were more manifest daily until date of death (ninetieth day).

Digestive System.—The tongue was persistently clean until towards the end, when a "typhoid state" became established, and constipation marked the case throughout.

Special Senses.—There were no symptoms showing any abnormality of the special senses. The fundus oculi was examined and found normal.

Treatment.—Opium and its derivatives by mouth and hypodermically gave the best results and were freely exhibited. Trional and such-like proved useless. Large doses of iodide of potassium failed to alter the progress of the case. Chloroform inhalation was given once and seemed to have a good influence. Complete immersion in a warm bath for some

hours was tried, and although great benefit to the bedsore accrued therefrom the subsequent collapse contraindicated the continuance of the treatment. Hypodermic injections of strychnine (1 per cent. solution), gradually increasing up to 10 minims, seemed to alleviate the symptoms of the "typhoid state" in a marvellous way. Brandy was freely exhibited towards the end, and a most nutritious liquid regimen adopted throughout. Champagne as a stimulant did not seem to have the expected physiological effect.

Post Mortem (*five hours after death*).—The body was extremely emaciated and *rigor mortis* well established.

Nervous System.—The encephalon and spinal cord throughout its entire length were exposed *in situ.* The veins and venous sinuses of the cerebro-dura mater, and the veins of the spinal dura mater were much engorged. Beneath the visceral layer of the arachnoid of the cord at the lumbar enlargement were some few flakes of lymph, and the subarachnoid space was full of a clear colourless fluid, as were the lateral ventricles of the brain. The *Diplococcus intracellularis* was found in the fluid in both these situations. These were the only pathological conditions found in the central nervous system. A section of the spinal cord from the cervical region and one from the lumbar enlargement were examined microscopically and found to be normal. The brain weighed 48¾ ozs.

Circulatory system.—A large *ante-mortem* clot was found in the right ventricle of the heart, which was otherwise healthy.

Respiratory System.—The whole of the lower lobe of the right lung was in a state of "red hepatisation," and this condition was present to a less marked degree in the lower part of the upper lobe. This lung weighed 36 ozs., in contrast with the left, which was somewhat engorged, and weighed only 12 ozs.

Digestive System.—The whole of the intestinal tract was examined and no pathological conditions noted.

Urinary System.—Kidneys normal and weighed 4½ ozs. each. Spleen normal, weighed 7½ ozs.

Travel.

CLIFFDEN, MURREE HILLS, AS A HOT WEATHER STATION FOR FAMILIES.

By Captain R. H. FUHR, D.S.O.
Royal Army Medical Corps.

CLIFFDEN barracks for soldiers' families lie on the wooded slopes of the Pindi Point spur of the Murree range of hills, some 6,040 feet above sea-level. They are arranged in blocks of five or six sets of rooms to one building, and are built on such level plots in near proximity as are available. A single set of rooms comprises a front living-room screened by a wooden partition about eight feet high from a bedroom, which has a bath-room of the ordinary Indian pattern annexed. A double set of rooms comprises two communicating single sets.

In 1904 some sixty-eight families were accommodated, and the camp population was sixty-eight women and 145 children, with a Camp Quartermaster-Sergeant, Schoolmaster, Provost Sergeant, and six soldiers for police duties.

The barracks are provided with a small number of stoves for such women as prefer to cook in their own quarters, and a kitchen built near at hand for every six or eight families who have native cooks. A post office, coffee shop, canteen, library, shoe-makers' and tailors' shops make the camp self-contained. There is also a good railed-in recreation ground.

The hospital comprises four blocks of buildings, namely, an isolation block, situated some 150 feet below the administrative building, and having near at hand a disinfector and destructor. The administrative block consists of the Assistant Surgeon's quarters, a dispensary and office.

The main building is some thirty feet higher up the slope from the foregoing, and is arranged in one long room divided by doors into two eight-bedded wards connected with two accouchment rooms by a short covered passage, and also with a two-seated latrine.

The bath-room is close by, and the last block—the kitchen—is approached by a flight of steps, as the site is nearly as high as the hospital roof.

The accumulated necessaries and luxuries purchased from the "Garden Fund" have made the hospital exceedingly comfortable as regards furniture, curtains, &c.; and the soldiers' wives take full advantage of the medical treatment available. The stock of instruments and appliances has also been increased by private purchase, and in 1904 some eleven major operations were performed.

During the hot weather season of 1904 the admissions for women were forty-nine, giving a daily percentage of 0·25; and for children forty-seven, percentage 0·24. An average of four women and five children received advice and medicine at the dispensary daily.

Of infectious diseases, measles, German measles, mumps, whooping cough and ophthalmia occurred. The white population in India was only increased by seven boys and ten girls, and one woman and four children died.

The above daily rate of sick, many of whom suffered from "green diarrhœa," although in part due to the medical selection of delicate women and children for the privilege of occupying quarters in Cliffden, can also be referred to the following local causes:—

(1) *The Locality.*—A mountain-side, which, although densely wooded, and beautiful in every way, receives the surface drainage from the higher slopes.

(2) *The Conservancy System*, which is the usual dry-earth trench system, would, if carried out under rigid supervision, be undoubtedly above any condemnation. But as the excreta from the slopes above Cliffden, which are covered with isolated bungalows, has to be collected by natives in iron drums and conveyed to a wire-carrying station, and then sent down in large drums several hundred feet to the filth-trenches below, it is obvious that, given limited observation over the sweepers, and a convenient secluded spot, the native would hardly be human if he did not risk severe punishment and lighten his load by dumping it on the ground. In Cliffden the drums are collected twice daily and carried one and a half miles to the nearest trench, which is well away from the camp, and at a lower level. The sullage water from the kitchens is also so disposed of, but as a rough stone gutter conducts it from the kitchen sink to the drum much is spilled and the ground thereby fouled.

(3) *The Kitchens* are very small for the cooking for some six to eight families in each. To any one who has served in India the resulting condition needs no further description. The servants are paid privately by the families, and if made to keep their kitchens clean simply run away. It often happens that the sanitary zeal of the camp officials thus deprives a mother, with a fortnight-old baby and several other small children, of her only servant and help.

(4) *The Native Servants.*—There is only accommodation for the camp sweepers and "bhisties." It follows that the sixty or seventy private servants either live some distance away or sleep in any hole

or corner they can find. Natives do not seem to value such sanitary precautions as using a latrine, and so the surroundings of the camp are likely to be fouled.

By the foregoing it is evident that a good deal of dirt, which so favours many disorders, especially "green diarrhœa" of children, is present. Much has and is being done to remedy this, but more should be done as regards (3) and (4).

The first important supply in a families' barracks is undoubtedly a good pure milk. This has been secured to a certain extent by the monopoly of the supply by a Government dairy. Such a step, doing away with the dirty native contractor, is, of course, beneficial, but the writer would prefer to see such dairies worked and managed by white men. In Murree, the responsible head of the dairy is a gentleman who has also a large dairy in Rawal Pindi to supervise, and has to leave a Lance-Corporal of a British regiment to act for him in his frequent absences. The rest of his staff are almost entirely natives, and this allows of too much unsupervised native handling of the milk. Milk is so easily filled with micro-organisms, and "green diarrhœa" caused by such a supply so frequently fatal, that every possible or probable loophole for contamination should be closed. The water supply is excellent, and is a pipe supply from springs near Doonga Gali.

The Government rations are very good, and the local coffee shop has a very moderate tariff for excellent articles as luxuries and additions.

Although the regulation allotment of quarters seems to cause overcrowding in many cases, and hence renders the spread of infectious disease difficult to check, still the benefits derived from the open-air life in such a situation often builds up a store of health for the women and children.

The rains begin about the beginning or middle of July and last until about the end of September. There are many beautifully fine days intervening, however, and although this is the sickly season, the damp heat being very trying at times, still the children seem to thrive. Many a future soldier or useful citizen of the Empire is born in Cliffden, and many a pale, weary-looking woman or child owes the restoring of health to its existence as a barracks for families.

The month of October is keen and bracing, and sends us all back to the plains looking more like recent arrivals from home than dwellers in the East. Cliffden thus justifies its existence as a tiny factor in the upkeep of the health of the white people in India.

Advisory Board for Army Medical Services.

THE TREATMENT OF VENEREAL DISEASE AND SCABIES IN THE ARMY.

FINAL REPORT.

TABLE OF CONTENTS.

(1) The three previous reports have been drawn up with the intention of bringing together in an accessible form the most recent information on the subject of the Committee's enquiry.

It will be recollected that the First Report deals chiefly with current medical literature, both British and foreign, and with information in possession of the Army Medical Department; the Second Report contains the statements of physicians and surgeons who may be justly considered as representatives of expert opinion on this matter in British, civilian and military practice; the Third Report is an account of a tour undertaken by Major C. E. Pollock, R.A.M.C., by order of the Director-General, to collect information on the subject in various foreign centres suggested by the Committee. His interesting Report gives a record of the opinions of experts abroad, and also describes the treatment at present employed both in civilian and military practice on the continent of Europe.

In this Final Report the Committee is desirous of presenting the principal conclusions to be drawn from the information thus collected, together with practical recommendations as to treatment.

The Prevention of Venereal Disease.

(2) It may be premised that the subject of prevention of venereal disease, although not entering definitely into the terms of reference, is of so great importance that it has repeatedly claimed attention during the deliberations of the Committee.

Venereal diseases are so clearly contagious that the argument in favour of prevention by isolation of infected individuals, even by the operation of statutes having a penal character, such as the Contagious Diseases Acts previously in force in this country, seems at once to carry overwhelming weight.

The remarkable diminution of venereal disease among British troops in the stations where the Contagious Diseases Acts were in force, is an example of evidence which at first sight appears to bear the most cogent character. Closer consideration, however, of the figures and charts relating to periods subsequent to the abolition of the Contagious Diseases Acts demonstrates that other factors are concerned with variations in the prevalence of venereal disease in the Army. In any case, the isolation of a particular section of infected persons, namely, of diseased prostitutes, cannot be considered to be an ideal method of arresting the disease while large numbers of infected persons of both sexes remain free to spread the contagion.

It is noteworthy that in certain foreign countries where the police supervision of prostitutes has been carried out much more strictly than was ever attempted in the United Kingdom, serious doubts are now expressed as to the efficacy of legal restraint in arresting these contagious diseases.

One of the most remarkable examples of diminution in prevalence of a contagious disease is afforded by the history of syphilis in Sweden during the past century. The main factor in bringing about this diminution is considered by Professor Welander, of Stockholm, to have been the effective, and, if necessary, gratuituous treatment afforded in hospitals by the State to patients of both sexes without the stigma produced by police compulsion. The opinion of many competent Continental authorities is to the effect that the voluntary submission to treatment by infected persons of both sexes is more likely to diminish the prevalence of venereal disease than the compulsory treatment by police regulation of a special class only.

Taking into consideration the present state of expert opinion abroad, and the opposition certain to be raised in this country should the re-enactment of a statute on the lines of the Contagious Diseases Acts be proposed, the Committee has come to the conclusion that in the United Kingdom, at any rate, an attempt to grapple with the problem of venereal disease by methods of compulsory isolation and treatment is neither practicable nor expedient.

Better results are likely to be obtained by the diffusion of the knowledge of the serious consequences of these diseases, and the provision of effective treatment for both sexes under conditions to which no penal stigma is attached. If this conclusion is sound, the more necessary is it that trustworthy methods of treatment should be thoroughly understood by members of the medical profession, and rendered readily available both in military and civilian practice.

Syphilis.

Treatment by Mercury.

(3) The evidence gained by experience is at the present time unanimously in favour of the administration of mercury in the treatment of syphilis. Indeed, it may be said that the opinion of the majority of observers is to the effect that mercury is the only known drug which has a distinct effect in curing the disease. Other drugs and methods of treatment are of service in remedying certain manifestations of syphilis, or by improving the condition of the patient, but the administration of mercury must be looked upon as the main factor in effecting the cure.

The opportunity was taken, during this investigation, to obtain evidence as to the results of the non-mercurial treatment of syphilis occasionally attempted during recent times; in every case the results of non-mercurial treatment appear to have been unsatisfactory.

Commencement of Treatment.

(4) Differences of opinion prevail as to the date after infection most advisable for the commencement of mercurial treatment. It is admitted by all that, so soon as syphilitic infection has taken place, mercury should

be prescribed; but before committing the patient to a course of treatment which may last for some years, which is irksome and not devoid of danger, the necessity for treatment must be clear. The recognition of this principle is specially important when it is recollected that the administration of the drug may obscure evidence of the disease which would otherwise establish the diagnosis. If the syphilitic infection is in doubt, administration of mercury once begun must necessarily be continued, and if no further evidence of syphilis is forthcoming, doubt will always remain as to the true nature of the suspected disease. It is agreed, therefore, by nearly all, that the presence of syphilis must be absolutely ascertained before this drug is administered. The amount of evidence, however, required by different individuals in order to establish the diagnosis appears to vary within considerable limits. Some state that they are able to determine the presence of syphilis from the character of the sore of inoculation. Others require, in addition to the characteristic appearances of the sore, further evidence, such as the enlargement of the nearest lymphatic glands, or general lymphadenitis; while still other observers believe that in no case is the character of a sore sufficient evidence of syphilis to necessitate immediate administration of mercury, and that, before treatment is commenced, complete evidence of constitutional infection must be forthcoming, such as is afforded by the enlargement of lymphatic glands, together with the appearance of characteristic eruptions on the skin and mucous membranes, associated with general constitutional disturbance.[1]

It appears to the Committee that accuracy in diagnosis is essential to thorough treatment, and in such a matter the judgment of the medical adviser must be guided by his own experience, and by the special condition of the patient. It is strongly felt, however, that in all cases of doubtful infection the patient should be kept under close and, if necessary, prolonged observation, and that before mercury is administered, the presence of syphilis should be established without doubt. The risk incurred by delay in the administration of mercury is inconsiderable compared to the importance of a correct diagnosis.

General Scheme of Treatment.

(5) With regard to methods of administration, duration of treatment, and the amount of mercury necessary, opinions vary widely. Speaking generally, two schools of treatment exist at the present time: (*a*) The continuous school, who prefer to give a course of mercury for a definite period continuously, or with short interruptions only; (*b*) the intermittent school, who give mercury for certain periods separated by intervals

[1] The recent discovery of *Spirochæta pallida* in syphilitic lesions may be of importance in facilitating early diagnosis of the disease.

which are, taken as a whole, of longer duration than the periods of treatment.

The continuous school may be further subdivided into: (1) Those who give as much mercury as the patient can tolerate during the whole period of treatment; (2) those who diminish the dose of mercury as the manifestations of the disease disappear. Broadly speaking, the continuous school embraces English and American physicians. The intermittent school may also be subdivided into: (1) The periodic intermittent school—those who give definite courses of mercury at regular intervals, irrespective of the manifestations of the disease. (Most of the French, many of the German and other Continental experts are embraced in this group.) (2) The symptomatic school—those who prescribe courses of mercury only when the symptoms of the disease are manifested. (Professor Lang, of Vienna, his pupils, Professor Havas, and other Austrians and Germans prescribe treatment in this way.)

Methods of the Administration of Mercury.

(6) Of the methods of administering the drug, those which appear to be most efficient require special consideration.

At the present time the most common method of administration in general practice, both military and civilian, is by administering more or less continuous courses by the mouth for a period extending from eighteen months to two years. Of the efficiency of this method, when regularly carried out, there can be no doubt.

In civilian practice in this country it is the method almost invariably adopted, and its value is supported by a great mass of evidence. The responsibility of taking the drug rests with the patient, and in the majority of instances, when an individual infected by syphilis has explained to him the serious character of the disease, the necessity of cure, and the efficacy of the drug as the curative agent, the course of treatment is vigorously pursued till a satisfactory result is obtained.

In the case of individuals who, on account of ignorance, carelessness, or for other reasons do not pursue treatment regularly, it is clear that the results will not be satisfactory.

In military practice the patient is placed under widely different circumstances. The soldier is moved from station to station, he may be careless as to the effects of the disease, specially when outward manifestations are no longer visible, and the supervision of the medical officer cannot be constantly exerted. As a result the drug is often not taken.

From the evidence at the disposal of the Committee, it is evident that the method of administration by the mouth, though perhaps the most commonly employed, is especially liable to failure as a routine method in military practice. The methods of administration by inunction and injection are much more likely to prove efficient, both on account of the

increased certainty that the drug is absorbed when administered by these methods, and because the drug is used under the personal supervision of the medical officer.

In this report, therefore, special attention has been given to the administration of mercury by methods of inunction and injection.

General Precautions before and during Treatment by Mercury.

(7) In every case certain precautions should be taken before commencing treatment. The general condition and the weight of the patient should be noted for reference during treatment, and the weight should continue to be taken at regular intervals. Increase or diminution in the weight of the patient afford important indications of the action of the drug. The urine should be examined, especially to ascertain the presence or absence of albumen. If albumen is present, the administration of mercury must be continued cautiously, and the effect on the urine observed. In some cases the albuminuria disappears on the administration of mercury, but if albuminuria is due to chronic nephritis the administration of the drug must be continued with the utmost care.

The presence of actual or recent disorder of the alimentary system, *e.g.*, diarrhœa, dysentery, disease of the liver, should be noted, as individuals so affected do not tolerate mercury well.

The mouth and gums should be examined with special care, and every precaution taken to prevent the occurrence of mercurial stomatitis. Before treatment all useless stumps of teeth should be extracted, carious cavities stopped, and, if necessary, the teeth should be scaled. Many soldiers object to having stumps of teeth removed until the occurrence of stomatitis impresses the necessity for care of the mouth upon them. Each man must be taught to wash the teeth, preferably by means of a little cotton-wool wrapped round a wooden handle or the finger. If a tooth-brush is used, it must be carefully cleansed, as under the conditions mentioned it is specially liable to become foul. The teeth should be washed in this way morning and evening and once or twice during the day. The use of a special mouthwash after ordinary washing of the teeth is frequently advisable. A useful astringent mouthwash is made by dissolving 1 oz. of lead acetate in 5 ozs. of water and 1 oz. of common alum in another volume of 5 ozs. of water. The two solutions are mixed and filtered. The filtrate contains acetate of aluminium. A few drops of an aromatic oil or essence may then be added. For use the solution should be diluted with about ten parts of water. In cases where there is much foul ulceration of the mucous membranes, useful applications are potassium permanganate, 1 in 4,000, and peroxide of hydrogen, used as a spray, prepared by diluting the pharmacopœial solution in three parts of water. Every patient undergoing mercurial treatment should have his mouth inspected twice a week while in hospital, and every time he

comes for treatment when an out-patient. In spite of full explanation as to the necessity for keeping the mouth clean, very few men can be thoroughly trusted to do so without being watched. Actual ulcers of the mucous membranes may be touched with solid silver nitrate, or by a strong solution of this salt. Fungating ulcers, warts, &c., should be carefully cauterised after the use of cocaine. The superficial ulcers of the fauces and mucous membranes should be touched with a 10 per cent. solution of chromic anhydride (acidum chromicum—Ph. B.), and immediately afterwards with a strong solution of silver nitrate. The condition of the gums, or signs of early mercurial poisoning, should be carefully observed, and treatment regulated accordingly. The most reliable way to guard against mercurial poisoning is to have the urine analysed in order to determine the quantity of mercury excreted. The test for this purpose is, however, somewhat difficult and tedious, and to be of value should be done by a trained chemist.

Patients undergoing treatment in the hospital should be kept as much as possible in the open air. Regular exercise should be taken. During any course of mercurial treatment all debilitating influences should be avoided; smoking is usually and advisedly prohibited; the use of alcohol should be interdicted unless there are special indications for its administration. A plentiful supply of food is required, but it should be recollected that indigestible articles of food tend to make the intestinal tract irritable and thus interfere with the administration of the drug.

Methods of Administering Mercury by Inunction.

(8) In order to obtain the best results by the method of inunction, frequent warm baths are necessary. If this plan becomes commonly used in military hospitals a large increase in the number of baths and in the supply of warm water provided for venereal wards must be arranged for. As a method of treatment of soldiers as out-patients, the main objection to inunction is that it requires time and special arrangements for treatment. That it can be carried out in the case of soldiers not in hospital is clear from the experience of Surgeon-Major Rayner (*cf.* "Promotion Essay," by Surgeon-Major Rayner, and page 102 of the First Report). In civilian practice the best results are obtained from inunction when used in specially equipped establishments, where baths are provided and the services of rubbers can be obtained. The following plan of treatment for use in hospitals has been carried out and can be recommended:—

(*a*) Before the inunction is performed a hot bath is given for twenty minutes. When baths are not obtainable the patients must be directed to wash their hands, the part of the body to be rubbed, and the part rubbed on the previous day, before inunction.

(*b*) The following is a useful and easily prepared formula for the ointment:—

℞ Ung. hydrarg. .. .. grs. xl.
Adipis lanæ (B.P.) .. .. grs. xx.

Mix thoroughly and wrap in wax paper. One packet to be used for each rubbing.

These packets should be handed out by the medical officer to each patient, the time noted, and directions given as to how long the inunction is to be continued. The rubbing should be done slowly, exerting considerable pressure so as to force the ointment into the skin. A non-commissioned officer or trained orderly should be told off to watch the men. When the prescribed time has passed, the medical officer must himself inspect the men before dismissing them to wash their hands. When properly done the skin should look as if it had been rubbed over with black lead, not shiny and greasy. If there is any doubt as to whether the man has properly rubbed himself or not, the medical officer should order a further period of, say, ten minutes' rubbing and watch the patient do this.

(*c*) The inunction is to be performed daily for twenty or thirty minutes. The course of inunctions is usually forty-two, but the number may be increased or diminished and intervals given as occasion arises.

(*d*) The parts are to be rubbed in the following order: First day, both calves; second day, both thighs, avoiding the hairy parts; third day, the abdomen; fourth day, both forearms. If the inunction is used on the back, the application must be made by another patient, or by a trained orderly.

(*e*) Special flannel underclothing (condemned sets do well for this purpose) should be worn night and day for a week at a time during treatment.

Special facilities may require to be given to patients not resident in hospital.

Plan of Treatment for Two Years by Inunction.

	Months.	Grains Hg.
First Course:—		
42 daily inunctions	1½	840
Interval 3 months. Patient to be seen once a fortnight ..	3	—
Second Course:—		
42 daily inunctions	1½	840
Interval 3 months. Patient to be seen once a fortnight ..	3	—
Third Course:—		
30 daily inunctions	1	600
Interval 6 months. Patient to be seen at regular intervals	6	—
Fourth Course:—		
30 daily inunctions	1	600
Interval 6 months. Patient to be seen at regular intervals	6	—
Fifth Course:—		
20 daily inunctions	⅔	400
	23⅔	3,280

This scheme is suggested as advisable in the majority of cases. It need not be followed rigidly and will be varied according to the necessity of each individual case. The intervals may have to be shortened in some cases, while in others the fifth course may be dispensed with entirely. A short course of potassium iodide, say 15 to 20 grains daily for a fortnight, may be administered with advantage after the early courses and for a month after the third, fourth and fifth courses.

By Intra-muscular or Sub-cutaneous Injection.

(9) This method of treatment has, specially of recent years, been largely employed. When first introduced the occurrence of septic complications, *e.g.*, inflammation at the site of injection, abscesses, was so frequent that its practical utility was at once questioned, while the risks of embolism and of severe mercurial poisoning appeared so great that the method promised to be of little value as a routine practice; but from the beginning the therapeutic advantages of this method of administration of the drug were so obvious that continuous trials were made, with the result that, at the present time, the method of intra-muscular injection is well established as one of the most trustworthy methods of treatment of syphilis. The convenience of the method cannot be gainsaid. The requisite dose of the drug is administered by the medical officer himself; the patient attends daily, weekly, or monthly, receives treatment, and in the interval is able to follow his usual avocations. In military practice specially, when the medical officer has to contend not only against the prejudices and carelessness of the more ignorant of his patients, but in addition must encounter the difficulty of maintaining continuous treatment occasioned by the moving of troops from station to station, the practical advantages of the method render it specially serviceable.

The patient can be rapidly brought under the influence of mercury by the use of both the soluble and insoluble preparations. It is considered by some that the soluble preparations, such as the biniodide and the perchloride, are more transient in their influence, the drug when absorbed being rapidly excreted. Frequently repeated injections are therefore necessary to maintain the therapeutic effect. In the case of the insoluble preparations, on the other hand, the mercury when injected into the tissues is absorbed slowly, and thus an influence of some duration results from a single administration. It is in consequence of slow absorption that one of the dangers in the use of the various mercurial creams and of calomel seems to arise, for it appears that the drug may remain unabsorbed for some time in the tissues, then rapid uncontrolled absorption may take place, and serious mercurial poisoning occur. The fact that injections of the insoluble preparations require to be made at intervals of a week, or even longer, is of importance so far as convenience of administration is concerned.

Injection of Soluble Salts.

(10) The most readily obtainable salt in military hospitals, and one of the most efficient in treatment, is perchloride of mercury. The solution for injection should be prepared by dissolving the salt in normal saline solution, as the painful after-effects are considerably lessened in this way. The following is a useful formula :—

℞	Hydrarg. perchlor.	grs. viii.
	Sodii chloridi	grs. iv.
	Aq. destill.	♏ 400.

Ten minims of this solution are to be injected three times a week till the symptoms begin to abate; then twice weekly till all symptoms have disappeared. One injection a week should then be given to complete the course. If common table salt is used in the preparation of this solution it should first be dissolved and then filtered, as it always contains a certain amount of dust which will, when injected, cause local irritation. Many other soluble salts of mercury are employed in treatment.

The soluble salts possess two great advantages: (1) The ease with which they can be administered subcutaneously; (2) the rapidity with which they attack the syphilitic lesions. They do not produce so lasting an effect as the insoluble salts, and it is probable that to produce an equally good result approximately the same quantity of metallic mercury must be used in both instances. Recent experience of insoluble preparations seems to show that the full dose of metallic mercury required in an ordinary case to produce beneficial results is about $1\frac{1}{2}$ grs. per week for six weeks as a first course. Perchloride of mercury contains 73·8 per cent. of metallic mercury. To inject 9 grs. of mercury it is therefore necessary to use about 12 grs. of the perchloride. Ten minims of the above solution contains $\frac{1}{5}$ of a grain of perchloride, so that in order to inject 12 grs. of perchloride, 600 minims of the solution, or 60 injections of 10 minims each, must be given. This may be considered to constitute a full course, and is, indeed, a much larger amount than is usually given. The fact, that the actual amount of mercury commonly used in treatment is much less when soluble salts are made use of than when insoluble preparations are employed, probably explains the so-called "transient effect" of soluble salt injections.

Injection of Insoluble Preparations.

(11) In practice a carefully made suspension of mercury in an oily medium, the "grey oil" of Continental pharmacopœias, appears to fulfil all requirements. It is desirable that the mercury shall be suspended in as small an amount of the medium as is possible. A small injection appears to produce less discomfort to the patient; it is well not to inject a larger amount of inert material than is necessary; and it is convenient

to avoid frequent refilling of the syringe and consequent loss of time, when large numbers of patients are undergoing treatment.

Experiments have been carried out for the purposes of this report by Messrs Davy, Hill and Co., in order to determine the most serviceable preparation. As the result of many experiments and careful testing it has been found that the amount of mercury which can be safely suspended in ordinary media corresponds to a strength of 1 gr. of mercury in 8 minims.

A cream now frequently used in the Medical Service of the Army contains 1 gr. of mercury in 10 minims and is only slightly more bulky than is absolutely required. It is suggested that this cream, made according to the following formula, be retained as a standard preparation :—

℞ Hydrargyri	ʒi.	Mix.
Adipis lanæ (B.P.)	℥iv.	
Paraffini liquidi (carbolisat. 2 per cent.) ..	ad. ℥x.	

The mercury and the wool fat by weight, the liquid paraffin to be added by volume.

Ten minims of this cream contain 1 gr. (0·065 gramme) of metallic mercury.

Fifteen minims of this cream contain 1½ grs. (0·10 gramme) of metallic mercury. The dose of 1½ grs. corresponds to the 10-centigramme dose mentioned by Continental authors, and may be regarded as the full dose.

The consistency of this cream can be varied to suit the temperature of different climates. The prescription above noted is arranged to keep the mercury in good suspension at ordinary temperatures in temperate climates.

Great care must be taken during the preparation of mercurial creams of this type to obtain a thorough mixture of the mercury with the excipients; the mixture must be prevented from being too fluid, as the mercury naturally tends to precipitate. The consistency suitable for injection can be conveniently arranged by standing the vessel containing the cream in water of the requisite temperature.

The cream should be supplied in capsules or tubes containing sufficient for one or two injections, or in small jars of not more than two-ounce capacity. If sent out in large jars to hospitals, and stored, the mercury is apt to settle, as a layer, at the bottom of the vessel, leaving nearly pure oil in the upper portion. Under such circumstances, unless care is taken to obtain a thorough mixture of the mercury and the excipients before injecting the cream, dangerous accidents may readily occur. Such accidents are more likely to happen in the case of stronger mercurial creams.

A very useful preparation, which has recently been used for intramuscular injection, is the salicylate of mercury. The following formula is successfully used :—

℞ Hydrarg. salicylat.	.. ..	grs. x.
Paraffinum liquidum	.. ..	ad. ♏ 100.

Sig. 10 to 15 minims to be injected once a week.

This salt must be very finely triturated before being mixed with the paraffin, so as not to block the needle. The special advantages of this preparation are: (1) It can be prepared by simply mixing with the paraffin, no prolonged stirring being necessary; (2) it can be sterilised by heat as often as required, without undergoing alteration; (3) vigorous shaking before use is all that is required to ensure proper consistency of the mixture; (4) it is not affected by heat or cold, and is therefore suitable for use in any climate without special precautions to ensure its remaining fit for immediate use. It is supposed not to be quite so active as the mercurial creams or grey oils, but has been proved to produce good results.

Numerous other insoluble preparations of mercury, including those containing calomel, have been used for intra-muscular injection.

General Routine of Treatment by Intra-muscular Injection.

(12) The following routine of treatment, where large numbers of patients are being injected (Woolwich), has been found to work smoothly. Two days in the week are selected as "injection days," and every patient is ordered to attend on one of these days. Two orderlies assist the medical officer. One has the list of names and calls the patients in order. The other orderly sterilises the site selected for injection by rubbing the skin with sal alembroth wool moistened with methylated spirit till a red blush appears. In the meantime, orderly No. 1 has noted the man's name, and also the dose and date of injection on the syphilis sheet. The medical officer makes the injection himself. If necessary, the cream is first made sufficiently fluid by standing the vessel containing it in water at 80° F. Immediately before use it is well stirred with a glass rod. The rod should be carefully wiped before using it with a glass cloth, and not with lint or wool. Both the latter fabrics leave large numbers of filaments adhering to the rod, which are then introduced into the cream, and in many instances are no doubt injected into the patient. These accidents may account for some of the painful indurations which occasionally follow the injection. In any case, it is a wise precaution to pass the rod through a flame before stirring the cream, as this not only sterilises the rod, but destroys any filaments adhering to it.

The all-glass syringes with iridium-pointed needles, which have recently been issued, are most serviceable in giving the injection. The syringe, having been sterilised by drawing up olive oil heated to 160° F., is now filled with the cream, and the quantity selected as the dose is injected deeply into the muscles. It is advisable to have sterilised cloths at hand on which the syringe can be laid, or to wipe the needle and operator's

fingers, as it is important *not* to leave a deposit of the cream along the needle track.

The site usually preferred by the patient for the injection is also the most adapted for the operation, viz., the upper and inner part of the buttock. Some, however, prefer the shoulder, but the skin is tougher, and there is not so great a depth available for inserting the needle. Occasionally stiffness is complained of in the arm after injection in this area. It is recommended that the syringe should be detached for a few seconds after inserting the needle, to see if any blood wells up. If this occurs a vein has been punctured, and a fresh place should be selected for the injection. Between each injection it is necessary to dip the point of the needle only into the heated oil, the barrel of the syringe having been sterilised at the outset does not require further sterilisation between injections.

(13) The plan of treatment usually adopted in England when mercury is given by the mouth is a course, practically continuous, for eighteen months or two years. This plan, as already indicated, is liable to prove unsatisfactory in military practice. The following scheme is therefore drawn up on the supposition that intra-muscular injections of insoluble preparations are being administered. Modifications will be necessary according to the preparation used for injection, and still more so if treatment is being carried out by inunction or by other methods. At present there are no reliable data for what may be considered the minimum mercurial treatment of syphilis. The following course of two years' treatment may be considered as approximating to this idea:—

On being placed on the Syphilis Register, a course of six weeks' energetic treatment, usually in hospital, should be undertaken. This involves six injections of the mercurial cream, referred to above, and may be considered to correspond to daily inunctions for this period, or tri-weekly injections of soluble salts.

On finishing this course the soldier should have an interval of two months without any treatment, but should be inspected by the same medical officer once a fortnight. If he remains free from syphilitic manifestations for two months he should then be ordered a further course of four injections, one a fortnight. If fresh symptoms appear, a second course of six weekly injections must be ordered, followed by two months' interval. If free from signs of the disease, the next interval may be increased to four months, followed by another course of four injections. The succeeding interval may be increased to six months, followed by four injections, one each month.

The course just described is planned on the understanding that full doses of mercurial cream, containing $1\frac{1}{2}$ grs. of mercury in each, are administered, and that the case is of ordinary severity, yielding readily to mercurial treatment. It must be clearly understood, however, that no hard-and-fast rule can be laid down to suit every case. This scheme is suggested as the average amount of treatment required to cure the disease,

and to permit of the soldier fulfilling his contract with the State. If officers prefer to use other methods, such as the injection of the soluble salts, inunction, or administration by the mouth, the course of treatment must be modified accordingly. Every care, however, must be taken to make sure that continuous treatment under medical supervision is carried out.

The scheme mentioned above may be put in tabular form thus:—

Six weeks' treatment	6 injections	=	9 grs. of mercury.
Two months' interval.			
Two months' treatment	4 ,, ...	=	6 ,,
Four months' interval.			
Two months' treatment	4 ,, ...	=	6 ,,
Six months' interval.			
Four months' treatment	4 ,, ...	=	6 ,,
Total, 21½ months' treatment ..	18 ,, ...	=	27 ,,

Experience alone can show whether such a plan as this is sufficient or not, but if strictly carried out it will make certain that a continuous course of treatment has been administered. It is likely, in the majority of cases, to be an improvement on the plan of giving mixtures and pills to the patient and leaving them to be taken, or not, at his own convenience.

Scheme of Treatment for Out-patients.

(14) The following routine of treatment of out-patients has been in operation at Woolwich and has been found satisfactory. It is recommended as a plan to be used by medical officers in large stations with the modifications which may be found necessary under local conditions.

The injections are made on two afternoons of the week, say, Tuesday and Friday at 2.15 p.m. When a soldier is discharged from hospital after completing his full course of six weeks' energetic treatment he is directed to attend at the hospital in a fortnight on one of the injection days. He is inspected and his syphilis sheet is looked at to see whether there have been any special features in his history. The medical officer then determines the further procedure. He may require further treatment immediately or may be directed to attend for observation for a period of one, two, or three months, according to the circumstances of the case. When treatment is resumed, the usual plan is to give four injections of cream, each containing 1½ grs. of mercury, at intervals of a fortnight, as already described.

In large stations where the out-patients belong to different units it is often a matter of considerable difficulty to check the attendance and treatment of the men. The following system permits of this being carried out thoroughly with, it is believed, the minimum amount of labour:—

(*a*) *The Syphilis Sheet.*—This furnishes the man's previous history and treatment, and is necessary for the purpose of determining his future treatment. The future treatment having been prescribed, is entered on

the attendance diary and the man is told when to come again. A notification is then made to the man's commanding officer informing him of the dates of attendance.

(*b*) *The Attendance Diary.*—This is a "scribbling diary," having large pages for each day of the month. Under the date on which the man is first told to attend, his name and number are entered with the treatment decided on, thus:—

21345 Gunner Jones, F., 4.F. This indicates that the man is to have four fortnightly injections; or 3146 Private Smith, R., 6.W., means six weekly injections; or 74681 Driver Brown, G., Obs. M. This man is to attend for inspection once a month.

After being seen and treated, his name is crossed off with *blue* pencil to show that he has attended, and his name is at once entered on the date on which he is next due, together with the balance of treatment still required; thus, if originally marked 4.F., the next entry will be 3.F.

It is only by a plan of this character that the attendance of men in large stations can be systematically checked.

(*c*) *Treatment Book.*—This is a foolscap book ruled so as to leave a space in a line for the man's name and squares for each day of the month opposite to this. When a man has had his injection, the letter I. in red ink is entered on the square corresponding to the day of the month and the man's name. Should he leave the station on transfer to another, or go abroad, or on furlough, become sick and be admitted to hospital, or for any reasons become a "casualty," this is shown in this book by entering an initial letter in the corresponding square, thus: H. indicates admitted to hospital, F., gone on furlough, &c. At the end of the month a summary is carefully and distinctly entered on the syphilis sheet, and this may be forwarded to the hospital or to the patient's new station, as the case may require. This method seems a little complicated, but experience has shown that such a system is absolutely necessary if the syphilis sheets are to be accurately kept and continuous treatment carried out.

(*d*) *The staff required* in a large station consists of two officers, one non-commissioned officer, and one orderly.

This staff is necessary to permit of the treatment being carried out with as little loss of time as possible, an important point, as most of the patients are on duty, and leave to attend has to be obtained from their commanding officers. One officer examines the men as they come into the room, paying particular attention to the mouth and throat, a most necessary precaution. When soldiers are attending as out-patients for syphilis they are apt to pay little attention to lesions of the mucous membranes, and frequently do not mention them. These lesions should be noted, as they are nearly always highly infectious. If the man is progressing satisfactorily, he is told to continue and report himself again at the proper time, or he is passed on to the other officer for treatment, and a note is made in the attendance diary. The other officer gives

the injections with the usual precautions. When dealing with large numbers of men, it becomes a matter of considerable difficulty to take the weight and test the urine on every occasion. These precautions must not be omitted, however, and the weight of the patient should be recorded, and the urine examined at regular intervals during a course of treatment.

The non-commissioned officer's duty is to enter in the attendance diary whatever instructions are given by the medical officers as to attendance and treatment, and at the conclusion of the patient's visit to enter the results in the treatment book.

The orderly's duty is to prepare the patient for the injection. The skin must be cleansed by means of friction with spirit and sal alembroth wool, by the use of absorbent wool or gauze with a solution of lysol, or as otherwise directed, and when ready the patient is brought forward to the medical officer.

Experience in a large station has shown that treatment arranged in this way is satisfactory, even when large numbers are under care.

By the Mouth.

(15) This method of administration of mercury is commonly used, and, if properly carried out, there can be no doubt of its efficiency. In military medical practice the objections to its employment as a routine method of treatment have already received attention and need not be recapitulated. There are occasions, however, in which administration of mercury by the mouth may be necessary, and probably in many cases for intelligent men who are anxious to get well, the method can be used with advantage. The preparations of mercury ordinarily used in the form of pills are the grey powder, the blue pill, the green iodide of mercury, the salicylate, and the tannate of mercury. The preparations used in solution most commonly are the perchloride and biniodide. It is a usual custom to combine courses of mercury given by the mouth with the administration of the iodides, or to give alternating courses of mercury and the iodides. Experience seems to show that this method has its advantages. It requires to be emphasised that all the precautions prescribed for treatment by the other methods should also be taken when the drug is administered by the mouth. Indeed, special care should be taken of the teeth and mucous membranes, and the diet should be carefully regulated.

The following plan of treatment has been drawn up in order to indicate what may be considered to be an efficient course. The preparation used as the standard is a pill containing 1 gr. hydrarg. cum creta:—

First Course—	Months	Pills
One month, taking six pills a day	1	180
Interval of three days without pills	—	—
One month, taking four pills a day	1	120
Interval of seven days	—	—
One month, taking three pills a day	1	90
Interval of one month	1	—

		Months.		Pills.
Second Course—				
Three months, taking three pills a day	..	3	.. ..	270
Interval of one month	..	1	.. ..	—
Third Course—				
Three months, taking two pills a day ..	..	3	.. ..	180
Interval of one month	..	1	.. ..	—
Fourth Course—				
Three months, taking one pill daily ..	..	3	.. ..	90
Interval of three months..	..	3	.. ..	—
Fifth Course—				
Three months, taking one pill daily ..	..	3	.. ..	90
		21		1,020

Patients should be inspected once a week while under treatment, particular attention being paid to the mucous membranes of the mouth and tongue. The effect on each individual must be carefully watched, and the treatment varied to suit each case. After the third, fourth and fifth courses a short course of potassium iodide, 15-30 grs. daily, may be administered with advantage.

The Comparative Values of the Different Methods of Treatment.

(16) Owing to the constant changes of stations of both medical officers and their patients, and to the fact that different medical officers will no doubt prefer the different methods of treatment, a scale of equivalents has been drawn up as the result of experience, and is suggested tentatively, so that a soldier who has commenced treatment by one method may continue his treatment satisfactorily, though another plan of treatment is adopted :—

(i.) One injection of mercurial cream containing 1½ grs. (=10 c.gm.) of metallic mercury, is equivalent to—(ii.) three injections of a soluble salt, (say, perchloride of mercury containing $\frac{1}{5}$ gr. in each injection); or to —(iii.) seven inunctions of mercurial ointment using 20 grs. of mercury daily; or to—(iv.) twenty-one pills each containing 2 grs. hydrarg. cum creta, three pills administered daily.

The above scale of equivalents represents energetic treatment for one week.

The Mercurial Bath.

(17) Of other methods which have been made use of for the administration of mercury in the treatment of syphilis, the mercurial bath deserves some attention.

In the case of soldiers returning from tropical service, who may have become debilitated in health from other causes, in addition to syphilitic disease, it is not uncommon to find multiple cutaneous syphilitic lesions, showing a marked tendency to necrosis and ulceration. In such cases the use of the bath containing mercury in solution is frequently found to be

of service. The drug appears to exert a local curative effect on the cutaneous lesions, in addition to its recognised influence by absorption.

All the precautions directed to be observed during mercurial treatment must be scrupulously observed in the case of such patients.

The mercurial bath may be prepared according to the following prescription:—

℞	Mercuric chloride	60-180 grs.
	Ammonium chloride	1-3 drs.
	Water (at 98° F.) to	30 gallons.
	Or—	
	Mercuric chloride	60-180 grs.
	Diluted hydrochloric acid	1 dr.
	Water (at 98° F.) to	30 gallons.

The patient may remain in the bath from ten minutes to half an hour. The water in the bath must not be allowed to become too cold, and the patient must not become chilled after the bath. The baths may be continued till the cutaneous lesions have healed, when mercurial treatment may be carried out by other methods appropriate to the case.

Treatment by other than Mercurial Methods. The Administration of Iodides.

(18) Of the other medicinal methods in the treatment of syphilis one meriting serious consideration is the use of the iodides. Medical opinion, which found repeated expression at the meetings of the Committee, is strongly in favour of the value of treatment by iodides, although it is generally held that these salts must not be considered as substitutes for mercury. The majority of medical observers are specially convinced of the value of the iodides in the phases of syphilis attended by the formation of granulomatous infiltrations. The influence of the iodides in bringing about the absorption of the syphilitic granuloma is undoubted. In the opinion of some experts, however, the drug has a beneficial influence even in the early stages of the disease in which granulomatous infiltration is, as a rule, little marked. The iodides are prescribed in association with, or in courses alternating with, the administration of mercury.

The Method of Treatment known as Zittmann's Treatment.

(19) Zittmann's treatment has been favourably reported on recently, and appears to be of special benefit in the treatment of debilitated syphilitic patients returning from the Tropics. Accommodation should be arranged in the venereal divisions of large military hospitals to permit of this method of treatment being used in suitable cases.

Surgical and Hygienic Treatment.

(20) The attention of the Committee has been drawn on many occasions to the good results obtained in the treatment of syphilis by other methods of treatment than the administration of specific drugs. It is pointed out

that syphilis is a chronic infective disease, resembling, in the lesions which it produces, and in its progress, the maladies of which tuberculosis may be cited as an example. In the case of tuberculosis, no remedy of specific value equal to that of mercury in syphilis is known; still, much can be done for the alleviation and cure of tuberculosis by the methods of treatment at our disposal. Similarly much good may be expected in the treatment of syphilis by other means than by drugs. This opinion the Committee wishes to emphasise.

The employment of surgical treatment by the removal of bony sequestra and other necrosed tissues, and various plastic operations, should be utilised with discretion. In all cases of syphilis care as to the general health of the patient and as to his hygienic surroundings should be scrupulously observed, but in cases where great debility is present, it may be as the result of the disease or of some complicating malady; proper care not only mitigates the influence of the disease, but permits of the more efficient treatment by means of drugs. The general health of the patient can often be much improved by change of residence to the seaside, or to other favourable climatic surroundings, or by carrying out the treatment recognised in the case of tuberculosis as the "open-air treatment."

The Performance of Military Duty by Soldiers while under Mercurial Treatment.

(21) The Committee has attempted to ascertain the opinions of medical officers as to the fitness of soldiers to perform their military duties while undergoing mercurial treatment. As was to be expected, opinion is not in complete agreement on this matter. It is generally held that in the early stages of the disease, when contagion is easily possible, patients should be actually in hospital under treatment so as to avoid the risk of spreading infection by contamination of clothing, eating-utensils, &c. The divergence of opinion manifested itself in the case of patients who no longer suffer from the disease in its early and more contagious period, but still require mercurial treatment. Some medical officers are of opinion that patients under these conditions should perform light duties only, while others consider that such patients are fit for all duties. This divergence of opinion appeared to depend, to some extent, on the views held as to the amount of mercurial influence required to obtain therapeutical results. A much larger amount of mercury is considered necessary to produce a satisfactory result by some anthorities than by others; and it is reasonable to believe that patients under a serious course of mercurial treatment are rendered less resistant to the effects of exposure, however much they may benefit from the cure of their disease. There is reason, therefore, for care. It is also to be borne in mind that the character of the climate must be taken into consideration. The effects of exposure are more likely to show themselves at extremes of temperature than when the climatic influences are favourable.

The opinion is, however, widely held, and is supported by experience, that a patient suffering from syphilis, without destructive lesions and under controlled mercurial treatment, is capable of undertaking all ordinary military duties.

Syphilis and Active Military Service.

(22) Divergence of opinion was also manifested among officers as to the question whether men who had recently suffered from syphilis were fit for active military service in the field. The divergence of opinion may be explained by the fact that attacks of the disease vary in severity, and that, if lesions of destructive type have resulted, a factor has been introduced, capable of producing loss of efficiency apart from actual syphilitic poisoning. The fact is undoubted in cases of imperfectly cured syphilitic patients, especially if destructive lesions have already resulted, that debilitating influences, of whatever origin, tend to produce recurrences of the disease. Such recurrences are frequently met with, and have entailed invaliding to a degree seriously diminishing the numbers and efficiency of troops.

The opinion is, however, generally held that if the attack of syphilis has been of ordinary severity, especially if no destructive lesions have ever made their appearance, if no evidence of the malady has been observed during the previous six months, and a course of treatment has been carried out of the character recommended in this report, then the soldier may be permitted to proceed on active service in the field.

TREATMENT OF GONORRHŒA IN MILITARY HOSPITALS.

(23) The procedure about to be detailed fulfils the requirements of our present knowledge of the treatment of gonorrhœa. The appliances and staff provided in the venereal divisions of our military hospitals are at present not sufficient to carry treatment on the lines indicated, but arrangements should be made to permit of this being done.

Diagnosis.

(24) When a soldier is admitted to a military hospital with a purulent urethral discharge, and admits having exposed himself to infection, it is usual to diagnose the disease as gonorrhœa, and in practically all instances this diagnosis is correct, but the diagnosis should always be confirmed by the recognition of the gonococci by microscopic examination of the pus. This precaution not only permits of the confirmation of the diagnosis, but permits of a forecast being made as to the progress of the case. If the stains and appliances are in readiness a specimen of the pus should be ready for examination in less than five minutes. The staining should be repeated at least once a week, as the composition of the discharge affords a good deal of information as to the results of treatment.

Thompson's Two-glass Test.

(25) This well-known and important test seems to have been very much neglected in England, but is always practised on the Continent. It is performed as follows :—

The patient is told to pass about 3 ozs. of urine into one glass and the remainder into the second. The first urine passed in the morning should be obtained for the test, as all the discharge which has accumulated during the night is washed out, and a much more accurate indication of the actual state of affairs is presented than if the test is performed later in the day, when the patient may have swallowed large quantities of fluid and so diluted the urine. The results may be quite misleading in the latter case. If the first specimen of urine is turbid and the second clear, the indication is that the anterior urethra alone is infected and that all the purulent discharge has been washed out of the urethra by the clear urine coming from the bladder, *i.e.*, the disease is acute anterior urethritis. If both the first and second specimens of urine are turbid, the indication points to the fact that the gonococcus has extended backwards and infected the posterior urethra and that a condition of gonorrhœal cystitis exists, or as ordinarily expressed, the case is one of acute posterior urethritis. As the disease subsides the urine becomes less turbid, and the presence of "threads" become more noticeable; the "chronic" stage is indicated by a clear urine containing "threads." If the first specimen of urine is clear but contains mucous filaments, the condition is chronic anterior urethritis, while if both specimens of urine are clear but contain mucous "threads," the whole urethra is infected—the condition is one of chronic anterior and posterior urethritis, commonly called "gleet."

Treatment.

(26) Having determined the nature of the disease, the extent of the urethra infected, and the stage of the inflammation, the exact form of treatment can be arranged.

The view that gonorrhœa is an inflammatory catarrh and should be treated by general measures with rest, in order to allay the inflammatory processes, is no longer tenable, in view of the ascertained facts of the pathology of gonorrhœa and the specific nature of the gonococcus. Treatment should be directed to the destruction of the infective agent as speedily as possible before it has had time to extend to the posterior urethra. The unpleasant or even dangerous consequences of gonorrhœa, *e.g.*, epididymitis, arthritis, pyæmic infection, &c., do not in all probability occur unless the posterior urethra becomes involved. The mode of treatment must be specially selected according to the stage of the disease and the part attacked.

Acute Anterior Urethritis.

(27) This condition should be dealt with by the method proposed by Neisser, or by irrigation.

Neisser's Method.—This procedure consists in attempting to bring the gonococcus into contact with a powerful antiseptic at regular intervals during the day. The most powerful parasiticide we possess for this purpose is silver nitrate. This salt, unfortunately, causes a considerable degree of pain when applied to the infected urethra and in the presence of sodium chloride is precipitated, losing much of its antiseptic power. To obviate these two objections various compounds of silver with albuminous substances have been introduced. These salts do not become precipitated in the presence of sodium chloride, and are not supposed to cause much pain, while at the same time, they retain their antiseptic properties. The best known is protargol, others are albargin, argyrol, ichthargan, &c.

Two solutions of protargol are made, one of the strength of ¼ per cent., the other of 2 per cent. The injections must be made at least once in eight hours during the day and always immediately on rising and just before going to bed. The injections used must be of sufficient volume to moderately distend the urethra, so that the folds of the mucous membrane are opened out and the solution brought into contact with all portions of its surface. The fluid should be retained in the urethra as long as possible, in order to destroy the micro-organisms.

On the first day the injections should remain in the urethra for two minutes, on the second day for three minutes, on the third day for four minutes, and so on, till each syringeful is retained for a quarter of an hour. During this time the urethra may be gently manipulated with the fingers so as to make slight currents in the fluid and to wash away the gonococci and pus cells adherent to the mucous membrane. A case of acute anterior urethritis properly treated by this method should be free from visible discharge in a few days, and therefore, according to the usual standard of cure in practice up to the present time, fit for discharge. The urine should be examined, if possible, daily, or at least once a week, and treatment regulated according to its conditions; so long as "threads" are present the case cannot be looked upon as cured.

Irrigation Method.—This mode of treatment may be used either by means of an irrigator or a large syringe. If the former is preferred, the apparatus required consists of an irrigator-can to hold at least one pint, six feet of rubber tubing, and a Maiocchi's double-channelled glass nozzle. The patient is first told to pass his water, which is examined. The can is filled with potassium permanganate solution, 1 in 4,000, at a temperature of 100° F. The stream is then turned on and the outer surface of the glans and meatus washed over with the solution; the nozzle is now introduced into the meatus and the anterior urethra washed out by allowing a pint of fluid to run through the urethra. As a general rule it will be found sufficient to do this once a day or at most twice. In some cases a certain amount of œdema of the penis occurs, but this passes off if left alone, and need cause no anxiety.

If a large syringe (6 ozs.) is used a rubber tip must be fitted to the

nozzle to prevent damage to the urethra. The urethra is then to be washed out by filling it rather suddenly and then allowing the fluid to escape. The urethra should be filled and emptied frequently in this way. Experience is necessary to use this method correctly, for if insufficiently filled the urethra is not distended and the result is disappointing, while if used too frequently or over-distended the solution may be forced into the bladder.

Acute Posterior Urethritis.

(28) For this condition irrigations of the bladder with a solution of potassium permanganate of the strength of 2 grs. to the pint of water should be used, together with the administration of antiseptics, such as the salicylates, benzoic acid, urotropin, the balsams, &c.

Chronic Anterior Urethritis.

(29) This condition is shown by the presence of "threads" in clear urine. These "threads" are casts of Littré's glands, and indicate that the gonococci have gained a firm footing and penetrated deeply into their ducts. The administration of balsams, and the employment of astringent injections administered by the patient, are of very little value in such cases. Various methods are employed in the treatment of this condition. The simplest plan is to dilate the urethra, either by passing a large sound, or better, by using an expanding dilator. The result of stretching the mucous membrane is to squeeze out the contents of the inflamed follicles, and irrigation, if then used, will wash away the inflammatory material, including the gonococci, or an injection of protargol retained for a few minutes will destroy the active agent. This procedure may be repeated on successive days, and a cure is usually speedily effected. In a few obstinate cases it may be necessary to use the endoscope in order to locate the inflamed follicles, which should be slit open or cauterised, and an injection given.

Chronic Posterior Urethritis.

(30) This condition is much more difficult to treat, on account of the inaccessibility of the affected parts. Irrigations of the bladder by means of nitrate of silver 1 in 1,250, albargin 1 in 2,000, ichthargin 1 in 2,000, should be used first, and the urine watched to see what improvement results. Should the result be disappointing, dilation by passing a large bougie should be attempted. Should treatment fail, as it is likely to do when the prostate is the seat of the mischief, massage of the prostate must be employed. This is usually performed by filling the bladder with an antiseptic solution, the prostate is then massaged through the rectum, and the contents of the prostatic follicles expressed. Any obstinate or recurring gleet may often be cured by this method in a few days. In many cases, however, treatment for a considerable period is necessary.

Irrigation of the Bladder.—The bladder may be irrigated by means

of a large syringe, or the irrigator. If the former is used, the anterior urethra must first be flushed out, the syringe being then filled and applied to the meatus, the surgeon makes steady pressure till he feels the sphincter relax, and the contents of the syringe flow easily into the bladder. The patient should then be told to stand up, and after some ten minutes empty his bladder into a glass vessel.

The quantity retained in the bladder without discomfort, and the character of the evacuated fluid, should be observed. As progress towards cure continues, the fluid returned is less altered in character. When the irrigator is used to fill the bladder the anterior urethra is first washed out, using about half a pint of the solution; the outflow tube is then closed by the finger, and the patient is told to breathe deeply. The fluid will now run into the bladder, and the patient is asked to state when he feels that the bladder is full. The treatment otherwise is the same for both methods.

It is necessary to emphasise strongly the importance of perfect surgical cleanliness for all instruments employed in urethral treatment.

Question of Cure in Gonorrhœa.

(31) When the urine is found to be quite clear on three successive mornings all treatment should be stopped. Full diet should then be given, and directions to take sharp exercise for three days. Directions may also be given for allowing a certain amount of malt liquor. If the first urine passed in the morning after this is still clear, the patient can safely be considered as cured. The majority of cases, however, present considerable difficulty. When the posterior urethra has been attacked, and probably this occurs in about 85 per cent. of the cases which are not energetically treated from the first, the urine will be found to contain "threads" day after day. In these cases it is necessary to examine the "threads" microscopically after staining. When no gonococci are found on three successive mornings, in spite of the application of mildly irritating applications, for instance, the injection of a 1 per cent. solution of silver nitrate, the patient may be pronounced to be cured with reasonable certainty.

There is a great tendency to adopt a routine treatment by means of internal medications or injections performed by the patient for himself in all cases of gonorrhœa, irrespective of the stage of the disease or the exact seat of the inflammation. In consequence, many cases of simple anterior urethritis are allowed to spread to the posterior urethra, thus greatly increasing the duration of treatment and exposing the man to secondary inflammations of the testes and more serious complications, such as arthritis and pyæmic infection. On the other hand, too prolonged treatment by means of astringents, *e.g.*, injections of sulphate of zinc, a favourite remedy, tends to induce a chronic catarrh of the mucous membranes, and so maintain spurious gonorrhœa. It should be

constantly borne in mind that treatment must be regulated by the indications given after examination of the urine, especially by using the two-glass test as described, supplemented by repeated microscopic examinations.

Treatment of Soft Chancres.

(32) The treatment usually adopted in the case of soft chancres is to apply *lotio hydrargyri nigra* to the sore daily, and to await events. This is not always satisfactory, and it may be useful to call attention to one or two alternative methods, which produce good results.

Application of Heat.—The bacilli known as the *bacilli of Ducrey*, considered to be the specific cause of soft chancre, are rapidly destroyed by heat. An apparatus has therefore been invented by means of which a temperature of 107° F. can be maintained on the surface of the sore for twenty-four hours. The specific bacilli are then considered to be destroyed, and the soft chancre becomes a simple ulcer, which rapidly heals. Short of using the special apparatus, a good deal may be accomplished by applying fomentations as hot as the patient can possibly bear them, for the first few hours following admission into hospital. The ulcer will then be dressed with any simple antiseptic ointment.

A rapid method of treatment, much in use, is to paint the surface with liquefied carbolic acid; after waiting for one or two minutes the acid is thoroughly rubbed into the sore by means of a glass rod, or a piece of wool, and then a simple dressing is applied to the sore.

An application recommended by Dr. Unna consists of *one part* of salicylic acid with *two parts* of iodoform.[1]

Pure nitric acid may be applied to the sore after the use of an analgesic. This method of treatment is apt to cause pain, and should be used with caution. It is naturally not so popular as some of the others recommended.

Treatment of Buboes.

(33) Operations on inflamed and suppurating lymphatic glands should be carried out in every case with care and strict antiseptic precautions. In many hospitals, especially on the Continent, as much care is taken in operating on these cases as with abdominal sections, and it is in consequence of this that the chronic suppurating bubo is rarely seen.

In the cases where indurated masses of enlarged glands are found they should be removed by careful excision. Experience shows that it is not necessary to remove every trace of these glands, and it is indeed often dangerous to do so, as they frequently surround the femoral vessels. The residue will usually become absorbed and disappear in a short time.

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[1] This dressing is often found to irritate, and must be used with caution and for short periods only.

When suppuration has not occurred, or only slightly, the wound may be sutured, provided surgical cleanliness has been observed, when primary union usually results, and the period of healing is greatly shortened.

Scabies.

(34) The treatment of scabies appears to have given rise in many cases to difficulty in practice. The enquiry of the Committee bears out the fact that much of this difficulty arises from the exaggerated importance attached to the local use of alkalies and sulphur while the value of the hot bath has been overlooked. The most effective part of the treatment of scabies consists in the use of repeated hot water and soap baths.

Baths of this nature are difficult to arrange in the wards in which cases of itch have hitherto been treated. The strongly alkaline preparations of sulphur have therefore been resorted to, and are, no doubt, more or less efficacious so far as the cure of scabies is concerned, but they have the almost certain result of producing an inflammation of the skin which is more difficult to cure than the actual attack of scabies, and make it almost impossible to determine with certainty when the disease has been got rid of. In the treatment of an attack of scabies, arrangement should first be made to give the patient a warm water and soap bath twice daily. After the bath a parasiticide ointment should be thoroughly applied over the whole body, and specially on the usually affected areas. The drugs which appear to be most efficacious in the treatment are sulphur, the balsam of Peru and β-naphthol. The ointment should be left in contact with the skin for so long a time as is convenient, and thoroughly washed off in the bath.

A course of eight baths with inunctions on four successive days is sufficient to cure all ordinary cases of the disease. If further treatment proves to be necessary, care should be taken to avoid the dermatitis which may result from the over-use of these parasiticide remedies.

All the clothing of the patient should be thoroughly disinfected by means of dry heat after the course of treatment, and the bedding which has been made use of should be dealt with in the same way.

The patient should be inspected at intervals of three days, seven days and fourteen days, after a course of treatment, to make certain that there is no recurrence.

The dermatitis which is sometimes apt to occur even with mild applications of sulphur, balsam of Peru and β-naphthol should be treated on ordinary principles; the removal of the irritant, the use of bran baths, followed by sedative calamine or lead lotions, usually effect a rapid cure.

Arrangements for the Treatment of Venereal and Skin Diseases.

(35) An important point arises at the threshold of any consideration of the arrangements required for treatment of venereal disease, viz., whether this disease should be treated in special hospitals or not.

Much importance attaches to the strongly expressed opinion that special hospitals for venereal diseases are not desirable. It is stated that a certain amount of disgrace would attach to those sent to these hospitals, and that soldiers would frequently conceal their disease rather than seek treatment in order to avoid being immured in a venereal hospital. Another point of considerable importance has to be borne in mind. With the tradition still existing as to the treatment of venereal patients, there is a tendency to regard the venereal division as a somewhat inferior part of the hospital, with the result that neglect of various kinds is apt to make its appearance. If the hospital is isolated it is possible that this tendency might increase. It appears, therefore, preferable that cases of venereal disease should be treated in specially arranged sections of hospitals equipped for the purpose. When it is necessary for purposes of convenience or economy to utilise existing buildings suitable for the purpose of the treatment of venereal cases, these buildings should be considered as sections of general hospitals, and included so far as is possible in the ordinary scheme of administration.

In the arrangement of such a division cases of syphilis and of gonorrhœa should, so far as is possible, be treated in separate wards. It is also advisable under present arrangements that a section of such a hospital should be devoted to the treatment of skin diseases, including scabies, and that the necessary equipment of baths and warm water supply should be provided on a liberal scale.

In charge of these sections for the treatment of venereal and skin diseases should be placed officers who have qualified as "Specialists in Dermatology, including Venereal Diseases." These officers should be encouraged to develop the study and treatment of these diseases in the light of modern methods. It will be also of advantage to the Service, that junior officers intending to present themselves for examination in the subject of dermatology and venereal diseases when qualifying for promotion to major, should be appointed to stations where wards for the treatment of these diseases exist under the charge of an officer with the "Specialist" qualification. Sections of military hospitals properly equipped in the way indicated will give advantages for the training of medical men, especially in the subject of venereal disease, greater than can be obtained at any civilian hospital in this country.

The "Specialist" officer in charge would naturally be interested in giving instruction in his special subject to his junior officers, and possibly to other medical men who may desire to attend. In the future it may be made a part of his duties to impart this instruction.

Scabies.—A special ward must be provided for the treatment of patients suffering from itch, and this ward must have its own bath-room and sanitary annexe. In view of the use of sulphur compounds in treatment, and the destructive effect of sulphur on most metals, the bath should be of glazed earthenware and not of enamelled or painted metal.

Treatment Block.

(36) In large stations where numbers of patients suffering from skin and venereal diseases will naturally be found, divisions of hospitals equipped with wards, treatment and operating rooms, will, it is hoped, be arranged, but in the case of small hospitals where special divisions cannot exist, the treatment of these diseases would benefit greatly if it were possible to establish a room fitted with the necessary apparatus for special means of treatment in the case of in-patients, and where injections, applications and dressings could be made in the case of out-patients. The intra-muscular injection of mercury in cases of syphilis, the local treatment of syphilitic lesions, the injection and irrigation methods now used with so much success in the treatment of gonorrhœa, and special treatment in the case of skin diseases, would be carried out in the Treatment Room. Many of these methods of treatment require to be done actually by medical officers themselves; it is only rarely the case that they can be left entirely in the hands of orderlies, however skilful. If carried out in the Treatment Room everything would be done under the supervision of the medical officer. The establishment of such a room for treatment is calculated to encourage the development of regular and efficient methods by medical officers.

(37) The Committee has finally taken into consideration the question of structural alterations in existing hospitals, and the planning of new treatment blocks for efficiently dealing with venereal diseases.

It is understood that, under the centralisation scheme of the Army Hospitals Committee, venereal cases in each command are to be aggregated for treatment either in special wards in the large central hospitals or in separate venereal hospitals, the policy to be adopted in each instance being conditioned by considerations of finance, distances, structures, adaptability, and the like.

Hence it is evident that each case must be judged on its merits, and that only general suggestions can be made for the guidance of the Army Hospitals Committee.

The Committee was at first inclined to think that the ward annexes might be remodelled to serve for treatment rooms as well, but further consideration has convinced them that, generally speaking, this course is undesirable, and the annexes of venereal hospitals should, therefore, follow the lines of the approved annexes for general hospitals.

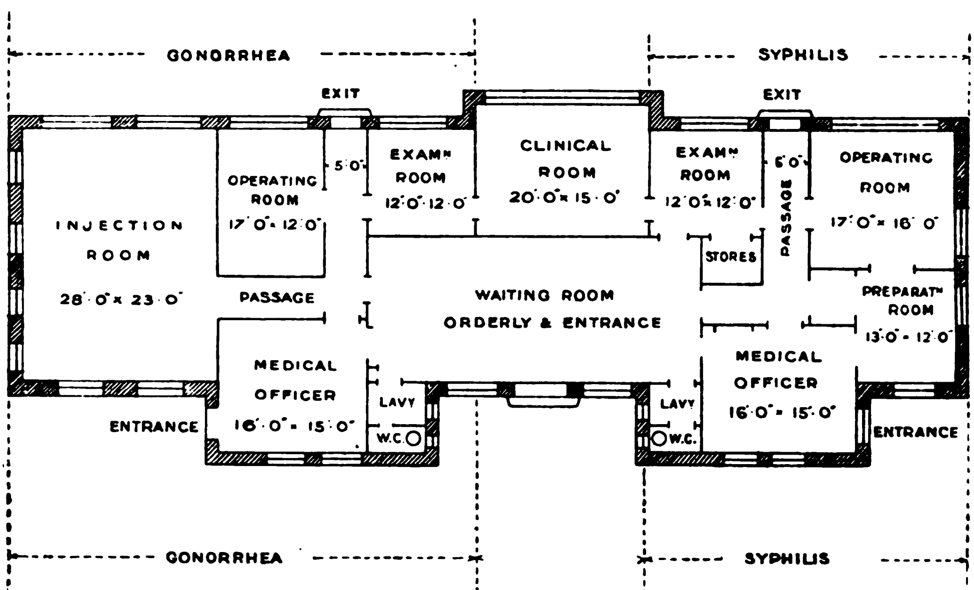
What, however, should be done in all but the smallest venereal hospitals is to provide a cubicle or room for a bath intended for continuous mercurial treatment in the proportion of one bath to fifty beds, and, in the large central venereal hospitals, there should be a room for the Zittmann treatment, capable of being kept at 80° F. day and night, and another room for a radiant heat bath, sometimes required for the treatment of patients coming from the Tropics.

It will often be practicable to adapt single-bed wards for these purposes.

For the large venereal hospitals at Bulford, Aldershot, and elsewhere, which are erected in hutting, it will be desirable to provide a treatment block in permanent materials, situated at a convenient distance from the huts, and connected with them by a covered corridor.

The schedule of accommodation which the treatment block should afford is detailed as under, premising that, where practicable, syphilitic cases should be kept separate from patients with gonorrhœa, both for housing and treatment rooms, and that of one hundred beds for venereal diseases it may be assumed that sixty will be required for syphilis and forty for gonorrhœa.

Plan of Treatment Block.



The sketch plan shows what would appear to be a convenient arrangement of the various rooms required for the treatment of syphilis and gonorrhœa when this is carried out in a separate building, but it is intended only as a guide and not as a plan to be rigidly followed by the Director of Barrack Construction. When existing hospitals are adapted, it may be advantageous to omit certain rooms (say the waiting rooms), to combine the medical officer's office with the patients' examination room, to use the same room for irrigation room and operation room, screened off, and in the treatment of syphilis to let the same room serve for the preparation of patients and for operations. The measures to be adopted in each case must be carefully considered and adapted to existing conditions, with due regard to efficiency and economy.

SCHEDULE.

Purpose	Accommodation	Fittings and equipment
For syphilis cases ..	Medical officer's office, 16 ft. by 15 ft.	Hanging cupboards for white coats, uniform, and private property. Two tables for note-taking, with drawers. Two writing chairs. Three chairs. Lock-up bookcase for records and forms.
	Patients' examination room, 12 ft. by 12 ft.	Fixed lavatory basins (2), and small sink with hot and cold water laid on. Couch for examination of patient. Small dressing table, lotion jar, lotion bowls. Dressing box. Waste bucket. Glass spatulas. Antiseptic bath for spatulas. Lamp for throat and eye examinations.
	Preparation room, 13 ft. by 12 ft.	Lotion jars (3). Dressing box. Waste buckets.
	Operation room, 17 ft. by 16 ft.	Fixed lavatory basins (2), with small sink, and hot and cold water laid on. Two operation tables of simple pattern. Lotion stand. Two dressing tables, two dressing boxes. Instrument steriliser and Bunsen's burner or spirit lamp. Glass cupboards for drugs and instruments. Two waste buckets.
For gonorrhœa cases	Medical officer's office, 16 ft. by 15 ft.	As for syphilis cases.
	Patients' examination room, 12 ft. by 12 ft.	As for syphilis cases.
	Operation room, 17 ft. by 12 ft.	Two fixed lavatory basins and sinks (hot and cold). One operation table. Lotion stand. Syringes. One dressing table. Instrument cupboard. Porringers. Urinal, fixed. One anæsthetic table. Dressing box. Two stools. Waste buckets. Instrument steriliser. Catheter and sound boxes. Rubber tubing.
	Irrigation room, 28 ft. by 23 ft.	Sixteen stalls for urethral irrigation, divided into sets of four, and so arranged as to secure privacy for the patient with supervision by medical officer. Maiocchi's nozzles.
For general services	Waiting room	Benches as required.
	Clinical laboratory, 20 ft. by 15 ft.	Fixed basin and sink (hot and cold). Urine-testing apparatus. Centrifuge. Microscopes. Microscope tables. Shelves and drawers for reagents. Bunsen's burners and spirit lamps. Incubators.
	Lavatories and w.c.	

Reprint.

GOVERNMENT OF INDIA "RESOLUTION" REGARDING MEASURES FOR DEALING WITH PLAGUE.[1]

(1) *Review of Present Situation.*—More than five years have now passed since the Governor-General in Council, when reviewing the report of the Indian Plague Commission, examined in the light of the knowledge then available the various measures which had been proposed or adopted with the object of checking the diffusion of the disease, and indicated the considerations of policy which must govern their introduction in India. During this period, while the efforts of Government officers have in no way relaxed, and the people themselves have in many places shown a disposition to acquiesce and even to co-operate in preventive measures which do not conflict with their social and religious usages, plague has gradually spread to almost every part of India, and, subject to certain seasonal fluctuations, tends to recur year after year with undiminished virulence. About a year ago the Government of India, acting in concert with the Royal Society and the Lister Institute, made arrangements for the appointment of a scientific commission which is now investigating the causation of plague in Bombay and the Punjab. Pending the completion of these researches, which may extend over a long time, and will in any case be directed mainly to the scientific aspects of the problem, the Governor-General in Council considered it desirable to place on record in a concise form the results of the practical experience which has been acquired in the last five years of actual plague administration. Local Governments were accordingly asked for reports, based as far as possible on the personal experience of their officers, on the conditions affecting the origin and spread of plague, the character of the measures to be adopted against it, the degree of success attained, and the causes upon which success or failure depend. The ample materials thus collected place the Governor-General in Council in a position to indicate those preventive measures which appear under present conditions most likely to be successful in the future.

(2) *Destruction of Rats.*—The most conspicuous change, in the opinion of experts in India, regarding plague since the issue of the Resolution of July 16th, 1900, is the greatly increased importance now ascribed to the part played by rats in spreading and keeping alive the disease. Rats are exceedingly susceptible to plague, and when once they are infected they usually communicate the infection not only to man, but

[1] Reprinted by permission of the India Office.

also to houses which have undergone thorough disinfection. It is therefore as essential to the safety of the community to destroy infected rats as to segregate plague-stricken people. In fact, almost all the evidence regarding the causation of plague may be regarded as pointing to the rat as the chief agent in its diffusion. For this reason the importance of destroying rats has been insisted on by the framers of the Paris Convention of 1903, and although European opinion is not unanimous on the point, the Governor-General in Council considers that the experience recently acquired in India warrants the belief that the systematic destruction of these animals promises to be one of the most effective measures that can be adopted for preventing the spread of plague.

(3) *Street Improvements, especially Paving and Draining.*—Observation has also shown that plague is most severe where the houses of the people are crowded together, ill-built and imperfectly ventilated, while it usually spares those areas in towns where the streets are wide, the houses well built, the alleys and side-walks paved, and the drains properly constructed. It follows that municipalities and local bodies should be encouraged and assisted to demolish insanitary quarters, to improve the paving of alleys and side-walks, to neglect no opportunities of widening narrow streets, to enforce simple building rules, and to perfect their systems of drainage and conservancy. All godowns where grain is stored should be rendered rat-proof, and should be liable to periodical inspection.

(4) *Disinfection.* — In theory, the disinfection of both houses and clothing takes a high place among preventive measures, and in cases of pneumonic plague it must be regarded as imperative. But the great difficulty of carrying out the process thoroughly in a house casts some doubt upon its practical utility, and the Government of India leave it to the local authorities to determine the extent to which it should be enforced with reference to the prevalent structural conditions. In any case, the efficacy of house disinfection depends entirely upon the methods employed. The fluids used must be really germicidal, such as solutions of corrosive sublimate, cyllin, or izal; they must be intelligently applied under proper supervision, and care must be taken to prevent the reinfection of the building by rats. These observations apply in their full force only to towns where the disease has not fully established itself. In villages the disinfection of houses is seldom of much use, while in towns where plague has become indigenous the difficulty of completely excluding the rats leads to constant reinfection.

(5) *Evacuation of Locality.*—Of the various measures hitherto adopted, with the object of arresting an outbreak of plague, none has proved so efficacious as the prompt abandonment of the infected locality for a period that varies with local conditions. In the case of villages, indeed, the evacuation of all the houses, accompanied by systematic destruction of rats, is probably the only means of effectually combating the disease.

It is, however, essential that evacuation should be carried out thoroughly; if a portion of the inhabitants remain behind, the disease will continue to spread. In all cases where evacuation is feasible the people should be encouraged to resort to it and assisted by the grant of blankets and warm clothing, where necessary, and by the provision of huts or the materials for building them.

(6) *Inspection of Travellers.*—The evidence which has been collected shows that the inspection of travellers by railway, road and steamship is often successful in averting or delaying the spread of plague, but that the efficacy of this measure depends on the circumstances in which it is applied. It is of most value in protecting limited areas, such as hill stations, and places so situated that the inspection posts command all routes of access. The mere inspection of persons arriving by steamer is, however, of little use, unless the rats on board the vessel are destroyed or are prevented from reaching the shore. A segregation camp for the detention of the sick is a necessary adjunct to every inspection station, but no one need be detained who is not actually suffering from plague. In all other cases it is sufficient to record the travellers' names and addresses and to arrange for their being under surveillance for five days. Experience has shown that mere contact with a case of bubonic plague in a railway carriage involves little danger of infection.

(7) *Quarantine.*—The example of prisons proves that quarantine may be relied upon to prevent the spread of plague by human beings, but it can seldom be applied effectually except by the people themselves, who have sometimes combined to prevent persons from infected places from entering their villages, and have provided accommodation for them outside the inhabited site. In rural areas the adoption of these measures may properly be encouraged; but they do not admit of application to towns.

(8) *Segregation of the Sick.*—The removal of the sick to hospital, while it is eminently desirable in their own interests, has always been unpopular, and in cases of bubonic plague the necessity for it may be avoided, provided that the surroundings of the patient can be kept clean and free from rats. That the measure is instrumental, however, in delaying the spread of the disease is undeniable, and even though segregation may be relaxed when indigenous cases become widespread, the first few cases imported into a plague-free town should, whenever possible, be segregated without delay. Cases of pneumonic plague, which is directly infectious from man to man, ought always to be segregated.

(9) *Segregation of Contacts.*—The segregation of persons who have been in contact with a patient suffering from bubonic plague is often impossible in practice. When it can be carried out with the goodwill of the people the measure is no doubt useful, but where coercion has to

be employed more harm than good is likely to result. In cases of pneumonic plague, however, the segregation of contacts is necessary, as the risk of infection is extreme.

(10) *Inoculation.* — Inoculation with the prophylactic fluid now manufactured at the Parel Laboratory is of value, not merely for the protection which it affords against plague, but also by reason of its effect in mitigating the violence of an attack. The extent to which it may be adopted depends upon the strength of the popular sentiment in its favour or against it, and the Government of India hope that the people may be encouraged to have recourse to it.

(11) *General Considerations.*—While the experience of the last five years establishes the utility of the measures enumerated above, it equally teaches that their application must depend upon the circumstances of the locality, the character of the people, the stage which the disease has reached, and the agency available for dealing with it. What is necessary in a district free from plague may be useless or vexatious where plague has become indigenous; what is effectual in one part of the country may be inoperative in another; a degree of control which is acceptable to a particular community may be strongly resented by people who observe a different code of social usage; and in a province with a well-developed system of village officials more can be attempted than in a province where no such organisation exists. Where the conditions vary so widely from province to province, as is the case in India, it is manifestly impossible for the Governor-General in Council to lay down a uniform scheme of plague administration. The local Governments alone are competent to determine what measures are practicable or expedient at particular times and places, and it is upon them that the Government of India rely to make the best use of the opportunities which present themselves for checking the spread of the disease. Finally, the Governor-General in Council would observe that in the last resort all preventive measures depend for their success upon the hearty co-operation of the people themselves, and that every effort should be made to enlist their sympathies and to bring home to them through their natural leaders, and in any other way that may be practicable, that it rests mainly with them to bring about by their action the cessation of plague in India, as it has long ago disappeared from Europe. When this conviction has been firmly established in the minds of the people the task of the district officers throughout India will be materially lightened. But that end can only be attained by carrying out thoroughly whatever measures it may be decided to introduce, and by impressing upon all officers concerned in plague administration that when a decision has been arrived at there must be no hesitation in giving effect to the policy approved by the local Government.

Current Literature.

Curious Migration of a Revolver Bullet.—*Le Caducée* quotes the following from the *Wiener klin. therap. Woch.* A man was shot in the chest with a revolver; the bullet penetrated the fifth intercostal space in the mammary line, and probably reached the pericardium. Four years later, the bullet could be felt in a right congenital scrotal hernia. Six months later, the man was operated on for hernia, and the bullet was found in a small peritoneal sac which was itself enclosed in the hernial sac.

J. E. NICHOLSON,
Lieutenant-Colonel (R.P.)

The Totsuka Stretcher.—Surgeon-Major Matignon, in *Le Caducée* for February 3rd, describes a new form of stretcher in use in the Japanese Navy.

Japan is the only Naval Power which, during the last ten years, has had an opportunity of testing its medical *matériel*, for in the Spanish-American War and the last China Campaign, the fleets had only insignificant opportunities of utilising their medical equipment. During the first war with China, the Japanese naval surgeons had an excellent opportunity at the battle of the Yaloo of dealing with many cases of dead and wounded, and consequently many kinds of apparatus were invented for removing the wounded from where they fell to the dressing-station.

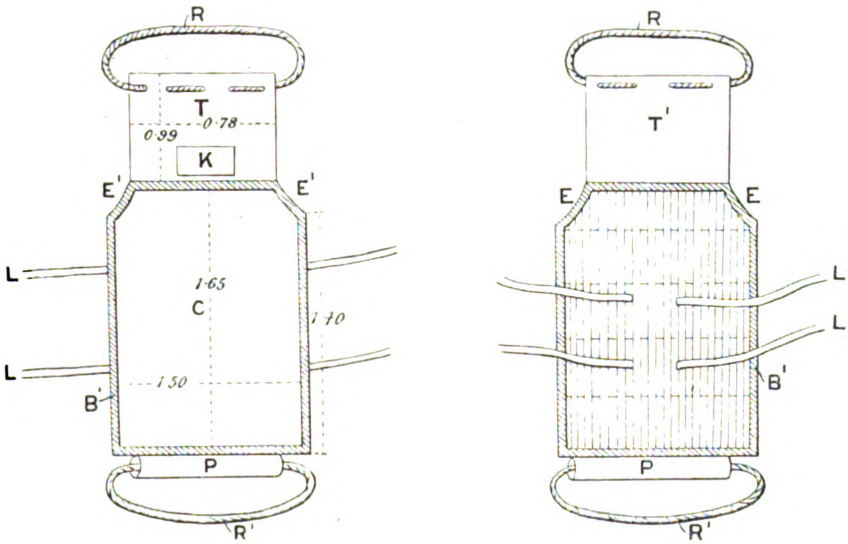
Through the courtesy of Professor Yabe, of the Naval Medical School at Tokio, Surgeon-Major Matignon was enabled to see the working of the ingenious and practical apparatus of Mr. Totsuka, designed by him for *dragging the wounded* along the decks of the war-ships. The word "stretcher" is therefore not an appropriate one for describing this apparatus, which is designed rather for the *haulage* than for the *carriage* of the wounded.

Totsuka's apparatus is, briefly, an instrument for rendering the patient immovable by wrapping him up in a covering which is rigid and yet elastic. It consists of a body with a few accessories.

The body of the apparatus (C) is made of strong sailcloth, strengthened externally with split bamboo laths, about ¾ of an inch wide; the upper corners (E, E) are cut away; the front or inner surface is usually padded with horse-hair, the folds of the stuffing running lengthwise. Two stout cloth girths (L, L) are fixed to the back or outer surface. The head-piece (T) is of sailcloth and fixed to the apparatus, its upper part is perforated with holes through which a strong hempen rope (R), two yards long, is threaded. The foot-piece (P) forms a running noose and is also of stout sailcloth through which a rope about 7 feet long is passed (R^1).

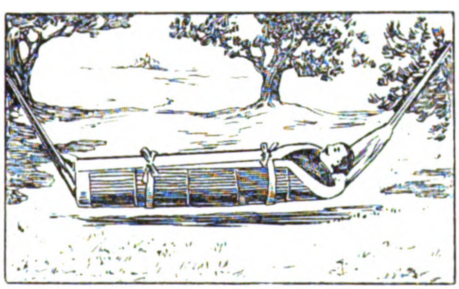
This so-called stretcher rolls up on itself for carriage and then looks like a rolled-up bamboo blind. It weighs about 20 lbs. if not padded, but about 33 lbs. if padded. When required for use, the apparatus is unrolled and laid out flat. The patient is placed lengthwise on it with

his head resting on the cushion (K), the two sides are then folded over him, being made to overlap as far as possible, and then the two girths (L, L) are tightly fastened. The lower rope (R^1) is now drawn taut so as to tighten the lower noose and thus prevent the patient from slipping through this end. The patient (who now looks somewhat like an



(Inside.) (Outside.)

Diagram of Totsuka's Stretcher.



The Loaded Stretcher.

Egyptian mummy) can now be carried by two men, by means of the two ropes (R, R^1), or more usually drawn by one man hauling it by the head rope (R), along the deck to the nearest manhole, when the loaded stretcher is hooked up on end and lowered to the between-decks, when he is now dragged to the dressing station.

This apparatus has given excellent results. It has, moreover, the advantage of reducing itself even when loaded to a minimum volume

which admits of its passing through openings which would be impassable for an ordinary stretcher, a condition of the utmost importance on board ship.

Whilst of greater interest for our comrades in the sister service, some of our brother officers who are interested in the question of stretcher-sledges for mountain use may possibly find in Totsuka's apparatus an idea which they can utilise when devising some new contrivance for hauling patients over the snow in winter time.

J. E. NICHOLSON,
Lieutenant-Colonel (R.P.).

On the Differentiation of Trypanosomes.—Koch, in the *Sitzungsberichte der Königlich Preussischen Akademie der Wissenschaften*, xlvi., 1905, contributes a paper on this subject. He introduces the subject by discussing the difficulties of differentiating the known varieties of trypanosomes. He believes that, with the exception of *Trypanosoma theileri* and *lewisi*, it is impossible either by the microscopic examination of the parasite in the blood of the diseased animal or by inoculation experiments into other animals to distinguish the commonly known varieties of trypanosomes, *e.g.*, *T. brucei*, *T. evansi*, *T. equiperdum*, *T. equinum*, *T. gambiense*. Koch, however, affirms as the result of his recent investigations in East Africa that he has discovered a means of differentiating the varieties of trypanosomes. He says: "I find in *Glossina morsitans* and *G. fusca*, which both carry the tsetse-fly disease (*T. brucei*), also in *G. palpalis*, which plays the same part in sleeping sickness (*T. gambiense*), undoubted developmental forms, and amongst these there are certain forms by means of which it is possible by their morphological characters to distinguish the two trypanosomes. It is highly probable that when the complete developmental cycle is worked out that still further differential characters will be got." In the alimentary canal of the fly he speaks of an enormous increase of the trypanosomes which are taken in. These trypanosomes fall into two types. The one type is distinguished by its broad diameter, large amount of plasma, which stains blue with Giemsa and Romanowsky stains, and round nucleus having a loose texture. The other type has a narrow diameter and therefore has a thin form, a complete absence of blue-staining plasma and an almost rod-shaped nucleus of compact texture which takes on a dark regular chromatin stain. At first sight it might appear that there were two different varieties of trypanosomes. He eliminates this by stating that they are always found together and only in infected specimens of the Glossina, and so they must be dependent on and be derived from the trypanosomes taken in with the blood. He regards the first type of trypanosome as the female and the second as the male. He compares the sexual forms of *T. brucei* and *T. gambiense* and finds certain differences which permit him to separate the two varieties. The first point is the relative sizes of the blepharoplasts (centrosomes) in the female types. *T. brucei* has a small rounded blepharoplast of 1·0 mm. diameter. The *T. gambiense* has a remarkably large and deep-staining blepharoplast; it is 1·5 mm. broad and 2·5 mm. long. It is oval and sometimes has a rod-shaped appearance. A very marked character is that it always lies at right angles to the long axis of the body of the trypanosome. A second differential characteristic is the relative sizes of the male types

of both trypanosomes. This is probably of less value than the first. In general, the female forms of *T. brucci* appear smaller than those of *T. gambiense;* the reverse is the case in the male types. The following are the exact measurements :—

		Length, mm.	Breadth, mm.
T. brucei	Female	25	3·6
T. gambiense	Female	37	3·0
T. brucei	Males	40·2	2·1
T. gambiense	Males	34	0·85

Koch states that the above described characteristics are so well marked and so constant, that in every single case it permits one to determine to which variety the particular trypanosoma belongs. "I doubt not that in this way the important but unfortunately still open question of the identity or difference of *T. brucci* and *T. evansi* will be decided. In future a trypanosoma will not be completely described unless its developmental cycle, at least in its important parts, is described."

The above is an account of Koch's method of differentiating the varieties of trypanosomes. It will remain to be seen whether other observers confirm his results, as regards the interpretation of the morphological characters of the trypanosomes met with in the alimentary canal of Glossina. Minchin's work in Uganda will have a special interest in this relation, and the results of his observations will be read with much interest. In the meantime the method of Novy and McNeal, by culture on blood agar, for the differentiation of trypanosomes is more exact than that of Koch's, because they are dealing with a pure culture of the parasite, whilst in the stomach of the fly it is impossible to say how many varieties of trypanosomes may exist. It is very easy to fall into a fallacy under these conditions, as Novy showed in connection with Schaudinn's work, that he was dealing with mixed cultures of protozoa instead of, as he thought, with a single variety. In connection with the differentiation of *T. brucci* and *T. evansi*, which Koch still regards as open, it is interesting to note that Novy, McNeal and Hare state "that this trypanosome (*T. evansi*) is differentiated by its cultural characteristics from *T. lewisi* and from *T. brucei.*"

E. D. W. Greig.

Phagocytosis in Vitro.—Ever since Denys and Leclef published their work on phagocytosis *in vitro* (*La Cellule*, 1895, t. xi., p. 177), and laid the foundation of that modern method of investigating infections—the determination of the opsonic index—the validity of their results has been questioned by some scientists. For instance: Metchnikoff (*L'Immunité dans les maladies infectieuse*, 1901, p. 298) doubted whether processes observed in the test tube could be rightly regarded as taking place in the living body. Denys and Leclef compared the bactericidal power of mixtures of the serum and leucocytes of normal rabbits, and those immunised against a streptococcus. Leucocytes, whether derived from the vaccinated or unvaccinated animal, were incapable of taking in and digesting streptococci in contact with normal serum. On the other hand, a preliminary treatment of the streptococci with the serum of the immunised rabbit enabled leucocytes from both sources to seize the cocci. Metchnikoff, while criticising their conclusion, said: "Researches pursued

over a long period have shown that phagocytosis *in vitro* indicates but imperfectly the sequence of events in the living organism. Very often the leucocytes fail to display their phagocytic function, although they are still motile, and, when transferred to the peritoneal cavity, eagerly receptive of bacteria."

Modern work on the influence of the immune bodies in phagocytosis explains this apparent anomaly. Nevertheless, Löhlein (*Annales de l'Institut Pasteur*, October, 1905) has taken up the discussion, and has established the worth of observations of the phagocytic powers of cells outside the body. He experimented with the leucocytes from human blood, and from the peritoneal cavity of guinea-pigs. The exudate withdrawn five to eight hours after an injection of sterile broth into the abdomen is rich in polynuclears. He found that there was no essential difference in the phagocytic process, whether the field of encounter was the peritoneal sac of the guinea-pig or the test tube. In every case where bacteria were englobed *in vitro* the same phenomenon took place *in vivo*. His experiments go far to strengthen the position of workers on opsonins who deal exclusively with ingestion of microbes by leucocytes in the moist chamber or tube. Löhlein also has repeated Metchnikoff's experiment of washing leucocytes free from plasma and of suspending them in urine. They still retain the power of taking up bacteria. Even virulent cholera vibrios were received and transformed into granules without the aid of any of the substances dissolved in the blood which favour phagocytes. He tried the effect of various other secretions, such as aqueous humour, as a medium in which he suspended the washed leucocytes. These were of no more service than physiological salt solution. Phagocytosis of virulent anthrax bacilli by washed white cells began almost immediately, even at laboratory temperature. Several leucocytes combined to compass the destruction of a long anthrax thread. Human phagocytes behaved in the same way as those of the guinea-pig. *Staphylococcus aureus* was rapidly englobed *in vitro*, but some virulent strains of streptococci were rejected, while harmless varieties were received. The behaviour of the cells to diverse cultures of the *B. coli communis* was variable. Some were avoided, but others were attacked. These results prove that washed leucocytes can take up certain virulent and pathogenic bacteria. The action of "stimulins," "opsonins," "fixateurs," "sensibilicatrices," "immune bodies," "amboceptors," which are probably names for the same thing, is relative only. Preparation of the bacteria with this substance renders their ingestion more rapid and the number seized greater, but is not always an essential factor for the process of phagocytosis *in vitro*.

C. Birt.

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REPORTS OF THE COMMISSION APPOINTED BY THE ADMIRALTY, THE WAR OFFICE, AND THE CIVIL GOVERNMENT OF MALTA, FOR THE INVESTIGATION OF MEDITERRANEAN FEVER, UNDER THE SUPERVISION OF AN ADVISORY COMMITTEE OF THE ROYAL SOCIETY.

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(Continued from page 506.)

BACTERIOLOGICAL EXAMINATIONS OF CASES OF MEDITERRANEAN FEVER.

BY CAPTAIN J. CRAWFORD KENNEDY.

Royal Army Medical Corps; Member of the Mediterranean Fever Commission.

I.—EXAMINATION OF SALIVA.

THE cases examined were four in number, and were selected on account of their severity.

CASE A.—A very severe case with persistent and irregular fever, no normal temperature for ninety days; extreme anæmia. Samples of saliva were taken from this case on the following days of disease, 36th, 37th, 38th, 39th, 41st, 42nd, 68th, 69th, 70th, 71st, 72nd, 73rd, 74th, 75th, 76th, 77th, 83rd and 84th.

CASE B.—A moderately severe case with four well-marked "waves" of fever. The third "wave" was the most severe. Samples of saliva were collected on the following days of the

disease, during the comparative apyrexial period between the third and fourth "waves," the 58th, 59th, 60th, 61st, 63rd and 64th days.

CASE C.—A severe case with marked anæmia. First "wave" severe, prolonged, lasting thirty days. Second "wave" very acute, lasting twenty-one days. Samples of saliva collected in the period between the first and second "waves" on the following days of disease, the 42nd, 43rd, 44th, 45th, 47th and 48th.

CASE D.—First "wave" ran a regular course, with little constitutional disturbance, though temperature was high; it lasted thirty-four days. The samples of saliva were collected on the thirty-eighth and thirty-ninth days of disease during the apyrexial period before the second "wave."

Method of Collecting the Saliva.—It was attempted to collect the saliva as it escaped from the orifices of the ducts, but, on account of the inconvenience caused to the patients, this was not persisted in. The patient was therefore asked to spit into a sterile test-tube after his mouth had been well cleansed by means of a tooth-brush and carbolic powder and well rinsed with a solution of boracic acid.

Method of Examination.—The saliva, being loaded with contaminating organisms, and, in especial, with acid-producing Streptococci, requires to be greatly diluted before its culture on plates could be attempted with any chance of success. Two or three methods were tried, but the following was finally adopted: Four or five test-tubes, each containing 10 cc. of distilled water, were sterilised and labelled respectively A, B, C, D, E. To A was added 1 cc. of the saliva; to B 1 cc. of the mixture in A; to C 1 cc. of the mixture in B, and so on. The diluted saliva was then planted out on Petrie dishes containing the nutrose litmus agar, 1 cc. from each tube being distributed over four plates. After incubation for four days the plates made from tubes A and B were, as a rule, found to be crowded with acid colonies, and quite useless. The higher dilutions gave very clean plates; 298 plates were thus examined, but *Micrococcus melitensis* was not recovered.

Result.—In thirty-two samples of saliva from Mediterranean fever patients in varying stages of the disease, no *M. melitensis* was found.

II.—*POST-MORTEM* EXAMINATION OF FATAL CASES OF MEDITERRANEAN FEVER.

During the year 1905 a more or less systematic *post-mortem* examination of fatal cases has been carried out in order to obtain

some idea of the distribution of the *M. melitensis* in the human body. A series of nine cases has been collected, and to these I have added four others which occurred in the previous year. A number of these have been examined in conjunction with Major Horrocks. My observations and remarks are recorded concisely under the headings of the various organs, and the accompanying table will show at a glance the proportion of recoveries of *M. melitensis* from each organ.

Spleen and Liver.—These organs invariably contain *M. melitensis* in large quantities during the febrile stage.

Kidney.—The organism is not so abundant here, and in one case was not obtained.

Bile.—Eight samples were cultured, and from two *M. melitensis* was recovered in pure culture, but in no great quantity.

Bile-duct and Bladder.—Scrapings were made from the walls in two instances. No recovery of the microbe was made.

Urine. — Last year, when the urine investigation was being carried on, three samples were taken from the bladder: one sample contained the microbe. This was the second occasion on which *M. melitensis* was found in the urine.

Intestines.—These were examined in four cases, and several hundred plates were made from scrapings from the walls or from the contents of the duodenum, jejunum, ileum and colon. The specific microbe was not detected, although it must be present, seeing that it occurs in the bile, but it evidently does not multiply in the intestines.

Bone Marrow was examined in four cases. Recoveries of the microbe were made in two of these. In one of them the colonies of Micrococcus were very profuse.

Heart's Blood.—Cultures were made in four instances, two of which yielded the microbe. One of the unsuccessful cases was a chronic one of a month and a half's duration; in the other only a very small quantity of blood was used.

Pericardial Fluid.—In one case out of two *M. melitensis* was recovered; this was one which had lasted for a month and a half.

Pleural Fluid.—One case was examined; result, negative.

Cerebro-spinal Fluid.—This was examined in two cases with marked meningeal symptoms. The fluid was much increased in quantity and had caused a good deal of flattening of the cerebral convolutions. Great difficulty was experienced in keeping it free from contaminations. No *M. melitensis* was recovered.

Lymphatic Glands. — A distinct advance has been made by

the discovery that the lymphatic glands are great receptacles for the Micrococcus. In one of my later cases I was struck by the size and appearance of the mesenteric glands. They were similar to what are found in enteric fever—the size of a large marble, fluid in the centre, and the capsule injected. On being cut they were found to contain, what was to all appearance, pus. A loopful of this fluid was spread over several Petri dishes containing the usual nutrient medium, and after incubating for four days a pure growth of *M. melitensis* resulted, so profuse as to cover every part of the plate that had been touched by the platinum wire. After this discovery the glands from other parts of the body were examined, and also found to contain microbes in great quantity. In one case the glands from the axilla, groin, mesentery, carotid and mediastinum were examined, but only from the mediastinal was the microbe obtained. In another case where the femoral, thoracic and mesenteric glands were examined, the microbe was present in the femoral and thoracic, but not in the mesenteric. This observation has been of the greatest value in the *post-mortem* examinations of experimental animals. In many cases they take the disease in a mild form, and the specific microbe soon dies out of the spleen, remaining, however, for a longer time in the glands. Therefore, the routine practice at *post-mortem* examinations is to examine the femoral, axillary and mesenteric glands, as well as the other organs. Had this not been done many *post-mortem* examinations must have proved negative, seeing that the glands were the only organs which contained *M. melitensis*.

The following idea is suggested by the foregoing observations. If the mode of infection happen to be through a mucous membrane, *i.e.*, the alimentary canal, the glands draining that area offer a good nidus for the multiplication of the *M. melitensis*, and in time form a good focus from which the whole system becomes infected. I think that many cases with long incubation periods might be explained in this way. For instance, a common type of the disease is manifested as follows:—

First, a slight attack of fever, labelled, for want of a better term, simple continued fever, lasting two, three or four days, with no agglutinative reaction in the blood. This probably coincides with the local invasion.

Second, a period of quiescence, lasting three weeks to a month or longer, the period of incubation.

Third, sharp attack of high fever, with no appreciable enlargement of the spleen till the third or fourth day. This marks the systemic invasion and the full development of the disease.

Tonsils.—In view of the glandular character of these organs and a possible entrance for infection, four cases were examined, but no *M. melitensis* was isolated.

Salivary Glands.—Concurrently with the examination of the saliva, two cases were examined *post mortem*, but without the recovery of the microbe.

TABLE AND SUMMARY.

Organ	Number of times examined	Number of times *M. melitensis* recovered
Spleen	13	13 = 100 p. c.
Liver	3	3 = 100 ,,
Kidney	7	6 = 85 ,,
Urine	3	1
Lymphatic glands	5	5 = 100 ,,
Mediastinal	1	1
Thoracic	1	1
Mesenteric..	5	3
Femoral	3	2
Axillary	1	0
Carotid	1	0
Heart's blood	4	2
Pericardial fluid	2	1
Bone marrow	4	2
Bile	8	2
Bile-duct and bladder	2	0
Intestines	4	0
Duodenum..	4	0
Jejunum	3	0
Ileum	3	0
Colon	1	0
Salivary glands	2	0
Tonsils	4	0
Pleural fluid	1	0
Cerebro-spinal fluid..	2	0

AN EXAMINATION OF GOATS IN MALTA, WITH A VIEW TO ASCERTAIN TO WHAT EXTENT THEY ARE INFECTED WITH MEDITERRANEAN FEVER.

BY DR. T. ZAMMIT.

Member of the Mediterranean Fever Commission.

I.—ATTEMPTS TO RECOVER *MICROCOCCUS MELITENSIS* FROM GOATS SLAUGHTERED AT THE CIVIL ABATTOIR.

As soon as goats were suspected to be liable to the infection of Mediterranean fever, an examination of the animals slaughtered at the civil abattoir was undertaken. None of the animals had been previously selected or examined, and some of them turned out to be male Barbary goats which had been brought to Malta to be fattened

and sold as mutton. When a goat was killed a capillary tube was filled with blood for the serum test, and the spleen was carefully removed and taken to the laboratory for examination; forty-six goats were thus examined, and the microbe was recovered in one case only. The serum reaction showed, however, that more than one goat had at some time been suffering from Mediterranean fever, for seven of the bloods gave a clear positive reaction with *M. melitensis* at a dilution of at least 1 in 80. All the goats appeared to be in good condition, and were passed by the veterinary surgeon of the abattoir for consumption.

II.—*Post-mortem* Examination of Goats bought in June, 1904.

The goats bought by us in June, 1904, and found to be suffering from Mediterranean fever, were slaughtered in September, 1905. Of six animals, numbered one to six, No. 4 never gave a reaction for Mediterranean fever, and was therefore used for other experiments. No. 3 always reacted strongly after it was sent to the Lazaretto. In July, 1905, it lost flesh, and on August 2nd, being in a dying condition, it was killed and carefully examined. A large number of broth and agar tubes were inoculated with material taken from all the organs, but the *M. melitensis* was not recovered. Nos. 1, 2, 5 and 6 appeared quite healthy. They were slaughtered between September 25th and 29th. The animals were in perfect condition, very fat, and with all the organs apparently healthy.

A great number of culture tubes were used for the examination, and fortunately so, for if fewer had been used it is probable that the microbe would have escaped notice in some of the cases. The *M. melitensis* was recovered from all the goats except from No. 2. During life this micro-organism had only been obtained from the blood of Nos. 5 and 6, but on the other hand it had been recovered from the urine and milk of all four goats. At the *post-mortem* examination the microbe appeared to be regularly distributed in the body and in rather small numbers.

In No. 1 it was obtained from the spleen and the kidneys, but in small quantities. In No. 5 it was recovered from the kidneys only. In No. 6 it was only found in the glands. Other goats (Nos. 15, 16, 17, 18), affected with Mediterranean fever, were slaughtered in September. The *M. melitensis* was recovered from all except from No. 18. In No. 15 it was obtained abundantly from the kidneys. In Nos. 16 and 17 only a few colonies were procured from the lymphatic glands. The serum reaction remained

positive and constant in all the bloods, though in some of them it became very weak, not higher than 1 in 40.

The *M. melitensis* in infected goats tends to disappear from the system after a time, but the process is slow.

Our goats having been bought in June, 1904, already infected, we could not ascertain how long they might have been in that condition, but it is a fact that after fifteen months the specific micro-organism was still living in their lymphatic glands.

III.—Recovery of *M. melitensis* from the Blood of Goats.

In certain phases of the disease the specific microbe circulates freely in the blood, and it can then be easily recovered. This condition does not seem, however, to last long, since a blood which yields the microbe one day, will not show any after the lapse of a week. About 5 cc. of blood were taken from the jugular vein of goats thirty-two times. The same animal was sometimes tried three or four times. The blood was distributed in 20 cc. broth tubes and incubated. The Micrococcus was only recovered from four goats (Nos. 5, 6, 21 and 29). The animals had all contracted the disease before they were obtained, and as when brought to us they already displayed a strong serum reaction, no idea could be formed as to the stage of the disease at which they had then arrived. Some of the cases were undoubtedly of long standing.

IV.—The Reaction of Goats' Milk to the *M. melitensis*.

On July 10th, 1905, I observed that the agglutination test could be applied to the milk of goats affected by Mediterranean fever as well as to the blood. At a point in our investigations it had become difficult to obtain samples of blood from goats, as the owners strongly objected to have their animals bled. The use of milk instead of blood for the specific reaction proved a great help, and enabled us to examine a large number of goats.

The test can be applied on a slide in the ordinary way or in capillary pipettes, as in the method of precipitation. In time, however, the precipitation method was adopted as being more conclusive and easier to work, especially when a great number of samples had to be dealt with. The only precaution to be taken in applying the test is the addition of an antiseptic, strong enough to prevent the clotting of the milk, but without affecting in any way the agglutinins. For the examination of a large number of samples

the following method was found to answer best: A strong emulsion of the *M. melitensis* is prepared in normal saline solution in a watch-glass. To this a small quantity of formaldehyde solution is added (one small loopful of a 1 per cent. solution), the whole being drawn into a pipette. One drop of the emulsion is placed on a glass slide and a loopful of milk is mixed thoroughly into it. This mixture is then drawn up into a fine capillary pipette, left in an upright position for twelve hours, and the reaction noted at the end of that time. The reaction is often seen after a few minutes. The cream collects at the surface and does not interfere with the reaction. Between July 10th and September 22nd, 1905, 710 samples of milk were examined and a positive reaction was obtained 133 times. With a view to check the value of this method, all the milks that showed a positive reaction were tested a second time. Further, where possible, blood was obtained from the animal for the serum test, and the suspected milk was plated out.

The blood test constantly confirmed the milk test, and when a strong reaction was obtained the specific microbe was always recovered from the milk. In conclusion, in my opinion, the milk test is a safe one and quite as reliable as the blood test. For sanitary purposes, more especially where a great number of goats have to be examined, the milk test is at once convenient and efficient.

V.—The Milk Test as applied to Goats in the Country.

As soon as the susceptibility of the goat to Mediterranean fever had been established, it became obviously desirable to ascertain how far herds which supplied milk to the towns and villages were affected. In July, 1905, we heard from one of the district medical officers that cases of the fever were numerous in two villages, Lia and Balzan, whereas few or none were reported from the neighbouring village of Attard. These three villages form a group lying close together about the centre of the island. It was decided, therefore, to examine the herds of this group of villages first and then work in other directions according to circumstances. Every village has a number of herds, but many goats are distributed singly, every family, as a rule, keeping a goat for its own use. I have arranged the result of the examination in the following tabular form :—

Name of village	Street	Number of goats in herd	Number of goats which reacted	Remarks
Lia ..	Molino Musta	15	None	
,, ..	Forni, 12	7	2	
,, ..	,, 24	4	None	
,, ..	Concezione	9	,,	
,, ..	Molino, 28	5	,,	
,, ..	Preziosi	13	,,	
,, ..	Concezione	11	,,	
,, ..	Reale, 9	1	,,	
,, ..	,, 128	2	,,	
,, ..	Stretta Enea, 2 ..	1	,,	
,, ..	,, ,, 3 ..	6	,,	
,, ..	Concezione, 33 ..	1	,,	
,, ..	,, Vlo, 3° ..	2	1	*M. melitensis* recovered. Case of Mediterranean fever on the premises.
,, ..	,, 28 ..	4	None	
,, ..	Forni, 54..	1	,,	
,, ..	,, 42..	1	,,	
,, ..	S. Andrea, 15	1	,,	
,, ..	No address	4	2	Goats were being taken to Musta.
,, ..	Reale, 82..	12	7	
Balzan ..	,, Vlo, 2°	18	6	The Micrococcus recovered from 3. Two cases of Mediterranean fever on the premises during the last twelvemonth.
,, ..	Provvidenza Vlo, 2° ..	20	2	
,, ..	,, Vlo, 3° ..	7	None	
,, ..	,, Vlo, 2° ..	17	3	
,, ..	,, ...	16	2	
,, ..	3, Chiese, 25	18	2	
,, ..	,, 9	1	None	
,, ..	,, 33	1	1	
,, ..	Itmeida, 16	1	1	Case of Mediterranean fever on the premises.
,, ..	No address	3	2	Goats were being taken to Musta.
Attard ..	Via C. Cormi, 22 ..	5	None	
,, ..	,, 2 ..	2	,,	
,, ..	Via Notabile, 3 ..	7	,,	
,, ..	Reale, 24..	2	,,	
,, ..	Lunatic Asylum ..	31	,,	
,, ..	Molino Vlo, 1°	4	,,	
,, ..	,, ,, 14	5	,,	
,, ..	S. Domenico, 19 ..	6	,,	
Zeitun ..	Herba, 16	8	,,	
,, ..	Giardino Botanico, 10	10	,,	
,, ..	Vlo Privato, 3	6	,,	
,, ..	Piazza Maggiore, 44 ..	12	,,	
,, ..	Madonna Pietà, 119 ..	11	1	
,, ..	Giardino B	11	1	
,, ..	Herba, 26	8	None	
,, ..	Sciortino, 22	11	,,	
,, ..	S. Giovanni	5	1	
,, ..	Sta. Maria	5	None	
,, ..	Marsascirocco, 11 ..	5	1	
,, ..	,, ,, (A.C.)	11	None	
Zabbar ..	Xghira, 75	8	1	

Name of village	Street	Number of goats in herd	Number of goats which reacted	Remarks
Zabbar ..	Marsascala, 22.. ..	8	None	
,, ..	,, 6.. ..	18	5	Micrococcus recovered from 3.
,, ..	Piazza S. Giacomo, 30	11	1	
,, ..	Sta. Maria, 12	7	None	
,, ..	Marsascala	13	3	
,, ..	Vlo Hassajed	7	1	
,, ..	Xghira, 72	5	3	
,, ..	,, 71	11	3	
,, ..	S. Domenico, 1 ..	4	1	
,, ..	S. Giuseppe, 68 ..	18	2	
,, ..	Capuccini	14	1	
,, ..	Marsascala	6	2	
,, ..	,, ...	14	9	
,, ..	S. Domenico	10	7	
,, ..	Tal Fgura	24	5	Micrococcus recovered from 2.
Hamrun ..	Dolori, 29	30	8	
,, ..	Vlo Tal Fatati	18	11	
,, ..	,, ...	35	5	
Axiak ..	Via Gudia	10	2	
Curmi ..	S. Pietro	8	1	
Taxbiex ..	Via Sliema	5	None	

The principal herds of Lia, Balzan, Attard, Zeitun, and Zabbar were visited, and about one-half of the goats of those villages were tested. The percentage of infected animals is therefore practically accurate. It stands as 12 per cent. for Lia, 19 per cent. for Balzan, 0 per cent. for Attard, 4 per cent. for Zeitun, and 25 per cent. for Zabbar.

As to Hamrun, only three herds were gone through, and there are hundreds of goats in that village. The percentage of infected goats at this place cannot be deduced from our work, but the three herds examined were badly infected.

CONTACT EXPERIMENTS.

BY MAJOR W. H. HORROCKS.

Royal Army Medical Corps; Member of the Mediterranean Fever Commission.

In the first report of the Mediterranean Fever Commission a description was given of an experiment in which a healthy monkey living between two infected monkeys became infected with the *M. melitensis*. The infection might have occurred in the following ways, *i.e.*, (*a*) by direct skin contact; (*b*) by placing in its mouth paws fouled with urine excreted by its neighbours;

(*c*) by means of mosquitoes; (*d*) by ecto-parasites passing from the skin of the infected monkeys to the healthy monkey. Experiments were devised in order to ascertain which of the above possible causes had produced the infection. In the first experiment a healthy monkey was placed in a box next to infected monkeys, and the boxes were surrounded by mosquito-proof netting. The monkeys were in intimate contact, and the boxes were frequently changed, the healthy monkey being allowed to live for a few days at a time in the box previously occupied by the infected monkeys. In this experiment the infection might have been carried by skin, urine, or ecto-parasites. In the second experiment the healthy and the infected monkeys were placed in a small cage covered with coarse wire and divided into two compartments by netting with very large meshes; the netting was fastened to a wooden ledge so arranged that fluid could not pass from one cage to the other. The compartments were of such a shape that when the monkeys were sitting in the cage back to back the skins were in intimate contact, and the monkeys could not turn round. As an additional precaution the arms, legs, and buttocks were placed in mackintosh bags. Infection under these conditions might be carried by both skin and ecto-parasites. In the third experiment a small mosquito-proof hut was divided into two compartments by fine wire netting fastened below to a board fixed to the terrace by cement. The conveyance of infection by urine, skin, and mosquitoes was thus excluded, and only ecto-parasites, which would easily pass through the wire netting, could have operated in conveying the *M. melitensis* to the healthy animal. The details of the experiments are as follows:—

Experiment I.—Monkey No. 91 and Monkey No. 95 were inoculated with the *M. melitensis*, subcutaneously, to act as infecting agents. Monkey No. 91 suffered from a long wave of fever, its temperature rose to 105° on May 29th, and remained so with a few intermissions until June 19th, when it slowly fell to normal. Its blood serum, diluted 1—500, caused immediate agglutination of the *M. melitensis*. Monkey No. 95 had a wave of fever lasting from June 20th to June 27th, and the blood serum, diluted 1—100, reacted with the *M. melitensis*. The monkey died on July 21st, and the specific microbe was recovered from the spleen, bile, mesenteric, femoral and axillary glands. A wooden framework, covered with mosquito-proof netting, having been erected on the terrace of the Public Health Department, three boxes were placed inside it. On May 25th

Monkey No. 92 and Monkey No. 91 were placed in contiguous boxes. The blood serum of No. 92 was examined, but no reaction was obtained.

June 13th.—Blood of Monkey No. 92 was examined, but no reaction was obtained.

June 14th.—Monkey No. 92 was found occupying the box of Monkey No. 91.

June 19th.—The blood of Monkey No. 92 was examined, but without any reaction.

June 24th.—The blood of Monkey No. 92 was again examined, with a similar result. Monkey No. 95 was put in a box, and the box of Monkey No. 92 was placed between those of Monkeys Nos. 91 and 95.

July 2nd, July 9th, July 16th, July 23rd, and August 9th. The blood of Monkey No. 92 was examined, but no reaction appeared.

August 20th.—The blood serum of Monkey No. 92, diluted 1—10, was found to agglutinate the *M. melitensis* at once, the reaction being visible to the naked eye.

August 25th.—Two cubic centimetres of blood were removed from a saphenous vein and planted out in broth-tubes; after seven days' incubation at 37° C. no growth was obtained.

August 31st.—The blood serum, diluted 1—100, caused immediate clumping of the *M. melitensis.*

September 11th.—One cubic centimetre of blood was removed from a saphenous vein and planted out in broth-tubes; after seven days' incubation at 37° C. no growth was obtained.

September 13th.—The blood reaction was found, as recorded on August 31st.

October 4th.—The monkey was killed with chloroform. At the *post-mortem* examination the body appeared fairly nourished, and the spleen and glands were not enlarged. Cultures were made from the spleen, liver, kidneys, bile, heart's blood, mesenteric, femoral, and axillary glands. The *M. melitensis* was recovered from the glands, but the cultures made from the other organs appeared sterile.

Remarks.—The monkey had no rise of temperature during the experiment, and save for a slight loss of flesh appeared perfectly well. The boxes of the monkeys and the floor of the enclosure were cleansed as little as possible, so as to permit of the infection by urine as well as by the skin and by ecto-parasites. The presence of the *M. melitensis* in the glands showed that an infection had taken place, and that it was produced by the urine is proved by the results of Experiments II. and III.

Experiment II.—A small narrow box covered at the sides with fine wire netting, and having a wooden bottom, was divided into two compartments, each just large enough to hold a monkey in the sitting position, by means of very coarse wire netting. A movable wire floor was sloped from the centre to the sides of each compartment, so that any fluid deposited on it would run off through the wire meshes into the space beneath. By this arrangement the possibility of urine passing from one cage to the other was completely obviated.

Monkey No. 91 was used as the infecting agent, and Monkey No. 88 as the contact.

Monkey No. 88 was kept under observation for fourteen days, and its blood repeatedly examined before the experiment was commenced.

On June 8th the monkeys were placed in the cage back to back. The open wire netting of the partition permitted the backs to be in intimate contact, and was merely used to steady the monkeys and prevent them turning round. The arms and legs and buttocks of each monkey were placed in waterproof bags so as to prevent dried urine being conveyed by the infected to the healthy monkey, should the former by any chance manage to turn round in the cage and pass its paws through the loose meshes of the partition. As soon as the monkeys were placed *in situ* the whole cage was covered with mosquito netting.

From June 8th to June 23rd, Monkey No. 91 and Monkey No. 88 were placed in contact daily for four hours. From June 24th to July 4th Monkey No. 95 was used as the infecting agent. The blood of Monkey No. 88 was examined on June 13th, June 18th, June 24th, and July 2nd, but no signs of a reaction with *M. melitensis* were ever seen.

On July 5th Monkey No. 88 was seized with an acute attack of diarrhœa, and he died on July 12th.

At the *post-mortem* examination all the organs appeared healthy. Cultures were made from the organs in the usual manner, but all proved sterile.

Remarks.—Infection by urine being excluded, this experiment seems to show that neither ecto-parasites nor intimate skin contact participate in the conveyance of infection from diseased to healthy monkeys.

Experiment III.—The object of this experiment was to ascertain whether ecto-parasites alone could convey infection from a diseased to a healthy monkey.

A small mosquito-proof hut, erected on the terrace of the Public Health Department, was divided into two compartments by strong wire netting, having a meshwork so fine that only small ecto-parasites, such as fleas and bugs, could pass through it. The wire netting was fastened below to a deal board a foot high and fixed by cement to the floor of the hut.

Monkeys No. 110, 92 and 101, were used as the infecting agents. Monkey No. 23, the healthy animal, was kept under observation for a fortnight before the experiment was commenced. Its blood was repeatedly tested, but no reaction with the *M. melitensis* was observed.

On September 5th Monkey No. 110, which had been injected subcutaneously with the *M. melitensis* specially for this experiment, was placed in one compartment of the hut, and Monkey No. 23 in the other, the chains of both animals being so arranged that when at full length they could not touch the wire partition. On September 10th Monkey No. 110 showed no sign of fever, and only a very feeble blood reaction. Monkey No. 92 was then placed in its compartment, to act as the infecting agent. On October 5th Monkey No. 92 was removed, and Monkey No. 101, then at the height of a wave of fever, was placed in the infected compartment. The blood of Monkey No. 23 was examined on September 14th, 20th, and 27th, and on October 13th no signs of a reaction with *M. melitensis* could be detected.

The experiment was continued until November 12th, Monkey No. 101 passing through a secondary wave of fever. The blood of Monkey No. 23 was repeatedly examined during November, but no signs of a reaction were observed. The monkey is still alive and well.

Remarks.—Ecto-parasites alone do not appear able to convey infection from a diseased to a healthy monkey. As the experiments had failed to show that ecto-parasites and direct skin contact play any part in the infection of healthy monkeys living in intimate contact with diseased monkeys, and that the infection was probably caused by the absorption of urine containing the *M. melitensis*, it appeared desirable to ascertain by direct experiment whether a monkey could be infected by feeding with the urine excreted by Mediterranean fever patients. Accordingly Monkey No. 119 was fed on urine added to dust and potato, &c.; the details of the experiment were as follows:—

Experiment IV.—Monkey No. 119 was kept under observation in a mosquito-proof chamber several days before the experiment

was commenced. On August 1st the blood was examined, but the serum gave no reaction. The monkey was then fed on fine sterilised dust moistened with urine from a case of Mediterranean fever containing large numbers of the *M. melitensis.* The urine dust, thoroughly mixed with potato, was on this occasion readily eaten. On August 2nd, 3rd and 4th, the feeding was continued, but it was noticed that after the first feeding the monkey ate very little of the infected potato. On August 7th, 8th and 9th, attempts were made to get the monkey to drink the urine in its natural state, but with poor success. On August 10th a few cubic centimetres of urine were rubbed up with a considerable quantity of boiled potato, and as the monkey ate the mixture readily, this method of feeding was continued daily until the 19th, after which date it was fed every other day until the 29th. The blood was examined on August 11th and 12th, but the serum gave no reaction. On August 28th, however, slight clumping of the *M. melitensis* was caused by the serum, diluted 1—10. On August 30th the reaction was quite distinct, the serum being diluted 1—10. On September 5th the blood serum, diluted 1—100, caused instantaneous clumping of the *M. melitensis.* On September 15th the monkey was killed with chloroform. At the *post-mortem* examination the spleen was found large, soft and friable. The axillary, femoral, and mesenteric glands were also found enlarged. Cultures were made from the spleen, liver, kidneys, bile, heart's blood, axillary, femoral, and mesenteric glands. The *M. melitensis* was recovered from the axillary, femoral, and mesenteric glands, the plates being crowded with colonies. It was also isolated from the spleen, but only a few colonies were found on the agar slopes. The remaining cultures proved sterile.

Remarks.—The monkey became infected about twenty-eight days after the feeding was commenced. There was no rise of temperature during the experiment.

Summary.

(1) So far as the experiments go it appears that infection cannot be conveyed from infected to healthy monkeys by skin contact alone, all other sources of infection being excluded.

(2) That infection cannot be conveyed from infected to healthy monkeys by ecto-parasites alone.

(3) That when healthy monkeys living in intimate contact with diseased monkeys, under mosquito-proof conditions, become infected, the infection is due to the absorption of the *M. melitensis* excreted in the urine of the diseased monkeys.

THE AMBULATORY TYPE OF CASE IN MEDITERRANEAN OR MALTA FEVER.

By Staff-Surgeon E. A. SHAW.

Royal Navy; Member of the Mediterranean Fever Commission.

The existence of this type of case amongst a people with whom a specific fever has been for scores of years endemic had long been surmised. The importance of such cases as sources of infection has been amply demonstrated by Koch in his anti-typhoid campaign in the Rhine provinces in 1902, but with regard to Malta fever the existence of such cases has hitherto been merely a matter of conjecture and not of absolute knowledge. Accordingly, in June of 1905, I set myself to the task of investigating the existence or otherwise of this type of case of Malta fever amongst the Maltese. For this purpose it was deemed necessary to have available a large number of Maltese actually in full work, each readily identifiable, and under control, so that any one individual could be readily got at for the necessary observations. The method contemplated was to examine the blood of a considerable number for agglutination reaction, and further to make a bacteriological examination of the blood and urine for *M. melitensis* of such individuals as might present a well-marked agglutination reaction. For obvious reasons women were not contemplated as subjects for the investigation. It was felt to be highly probable that there would be considerable difficulty in getting even a sufficient number of men to submit, voluntarily, to the necessary procedure. Having regard to various possibilities, I considered that the Naval Dockyard in Malta, which employs several thousands of Maltese, and gets over the difficulty of a frequently recurring identity of name by allotting to each man a number, offered the best field for this inquiry. I accordingly obtained from Admiral Bromley, the Admiral-Superintendent of the Dockyard, an authority to proceed as I proposed. It was arranged that the various heads of departments should send batches of men, told off without discrimination, to the Dockyard Surgery on days to be arranged between us for the purpose of having samples of their blood taken for the ascertaining of agglutination reaction. With the most cordially rendered assistance of Fleet-Surgeon Hardie, R.N., and Surgeon Westcott, R.N., I was able to obtain specimens of blood in capillary tubes from 525 dockyard employees. Each tube had a flag label attached to it bearing the man's name and dockyard number, and corresponding lists of names and numbers were prepared as the men came up to have

their fingers pricked. I next proceeded to examine these 525 samples of blood for agglutination reaction to *M. melitensis*, using a dilution of 1—30 of each for that purpose. This was a somewhat laborious undertaking, and my thanks are due to Major Horrocks and Captain Kennedy, who very kindly examined between them some 140 of the whole number of samples.

As the result of this preliminary examination it was found that 79 out of the 525, or 15 per cent., gave a distinct agglutination reaction with *M. melitensis*. Of these 79 a marked reaction was presented by 22, which were accordingly selected for a detailed bacteriological examination of both the blood and urine of the men on the following conditions.

Blood.—Bend of elbow sterilised, 5 cc. of blood taken from median basilic vein and placed in 80 cc. of nutrient broth in a flask, this well shaken and placed in incubator at 37° C., daily agitated; sub-cultures made on to agar slopes on sixth and on eleventh days. If no result appeared on fourteenth day, the investigation was abandoned as unfruitful; if a growth appeared, it was put through the usual tests for *M. melitensis*, and the result recorded. Blood was not taken more than once in each case, owing to the dislike of the subject to the operation.

Urine.—A supply of sterilised test-tubes was daily sent to the Dockyard Surgery; the men selected were told to call there each morning at 7 a.m. on entering the dockyard to commence their work. The surgery attendants were instructed (1) to see that each man cleansed the meatus urinarius and glans with 1—40 carbolic solution, and (2) to collect the first ounce of urine passed in a suitable vessel for rejection, and the second ounce in one of the sterilised test-tubes, which was then inscribed with the man's number and the date. The samples thus obtained were to be sent to me in the laboratory, where I immediately proceeded to plate each out. From each daily example of urine two Petri dishes containing nutrose litmus agar (no glucose), of a reaction + 10, were inoculated, $\frac{1}{3}$ cc. (six drops, about) being distributed over the surface of each with a spreader. These plates were numbered, dated, and incubated at 37° C. for six days. They were then examined and the likely colonies were put through the usual tests for *M. melitensis*. Where, as in Cases IX. and XI., the colonies of this organism were too numerous to be counted individually, the numbers given were arrived at by selecting an average area, counting the colonies contained in 1 sq. cm. of this, and determining the total number of sq. cm. covered with

colonies. The urines were thus daily examined for twenty-eight successive days, exclusive of Sundays.

I will now describe these 22 cases as briefly as possible. The temperatures given are those of each man for the first few days of the observations, the first being the morning and the second the evening temperature. All these men were in full work for the whole period of these observations, with the exception of Case I., who was at home once for three days on the sick list. For the temperatures and brief details of each case, my thanks are due to Fleet-Surgeon Hardie, R.N., of H.M. Dockyard at Malta, who tells me that he found it impossible to ascertain definitely what kind of fever it was which some of these men say they had previously had.

CASE I.—G. Araci, 4,112, aged 25, labourer. Had a week's fever about twelve months ago.

Temperatures.—99°/99·2°; 98·6°/99·4°; 99°/99·8°; 99·2°/99·6°; away three days; 99°/99·2°.

Blood yielded no *M. melitensis.*

Urine yielded	3	colonies of	*M. melitensis*	on July	4th.
	2	,,	,,	,,	12th.
	23	,,	,,	,,	19th.
	3	,,	,,	,,	21st.

CASE II.—G. Busutil, 1,918, aged 17, boiler-maker's apprentice. Had fever thirteen years ago.

Temperatures. — 98°/99°; 98·4°/99°; 98·6°/98·2°; 98°/98·8°; 98·4°/98·6°; 98°/98·4°; 98·2°/98·4°.

Blood yielded no *M. melitensis.*

Urine ,, ,, ,,

CASE III.—G. Ciantar, 3,528, aged 38, joiner. Was sick for two days two months ago.

Temperatures.—99·8°/100°; 99·6°/99·8°; 98·4°/98·2°; 98·0°/98·8°; 98·0°/98·4°; 98·4°/98·6°; 98·2°/98·4°.

Blood yielded *M. melitensis.*

Urine yielded	1 colony	of this organism	on July	6th.
	3 colonies	of	,,	7th.
	5	,,	,,	8th.
	3	,,	,,	13th.
	10	,,	,,	15th.
	3	,,	,,	17th.
	5	,,	,,	18th.
	10	,,	,,	19th.
	6	,,	,,	21st.
	1 colony	,,	,,	24th.

Case IV.—F. Darmanin, 4,221, aged 30, hammerman. Had fever twelve years ago.

Temperatures.—99·8°/99·4°; 99·6°/99·2°; 98·6°/98·0°; 98·2°/98·6°; 98·4°/98·4°; 98·0°/98·2°; 98·2°/98·4°.

Blood yielded no *M. melitensis.*

Urine yielded 3 colonies of *M. melitensis* on July 14th.

1 colony of	,,	21st.
9 colonies of	,,	24th.

Case V.—C. Cassar, 1,203, aged 28, assistant fitter. Has had headaches and giddiness for the last three months.

Temperatures.—99·0°/99·0°; 98·0°/98·2°; 98°/98°; 98·0°/98·2°; 98·0°/98·2°; 98·2°/98·4°; 98·0°/98·4°.

Blood yielded no *M. melitensis.*

Urine ,, ,,

Case VI.—T. Sceberras, 3,475, aged 35, joiner. Had fever in April and May last.

Temperatures.—99°/99°; 98·6°/99·0°; 98·4°/98·2°; 98·0°/98·6°; 98°/99°; 98°/98°; 98·6°/98·2°.

Blood yielded no *M. melitensis.*

Urine ,, ,,

Case VII.—F. Grima, 1,686, aged 50, founder. No history of fever. Complains of "general debility."

Temperatures.—100°/101·2°; 99·4°/99·4°; 99°/98°; 98°/98°; 98·4°/98·0°; 98°/98°; 99·2°/100°.

Blood contained *M. melitensis.*

Urine yielded 9 colonies of *M. melitensis* on July 11th.

1 colony	,,	,,	12th.
1 ,,	,,	,,	15th.
2 colonies	,,	,,	20th.
13 ,,	,,	,,	21st.
3 ,,	,,	,,	25th.

Case VIII.—D. Burlo, 1,094, aged 21, assistant fitter. Had "fever" lasting fifteen days two years ago.

Temperatures.—98·0°/98·8°; 99·0°/98·6°; 98·6°/98·2°; 98·4°/98·6°; 99·2°/98·0°; 98·2°/98·2°; 98°/98°.

Blood yielded no *M. melitensis.*

Urine ,, ,,

Case IX.—B. Worley, 1,857, aged 29, boilermaker. Had fever ten months ago.

Temperatures.—98·0°/98·4°; 98·0°/98·4°; 98·2°/98·6°; 98·0°/98·8°; 98·4°/98·4°; 98·0°/98·4°; 98·0°/98·2°.

Blood yielded no *M. melitensis.*

Urine contained *M. melitensis* every day from July 3rd to end of August, usually in very large quantity. It was then arranged to examine it twice weekly; it has been present on every occasion up to date of writing (November 21st). The periodical examination is still being continued. Enumerations of the colonies were made on following dates in the manner described :—

July 5th,	26,631	colonies of *M. melitensis* per cc. urine.
7th,	57	,, ,, ,,
10th,	16,023	,, ,, ,,
14th,	24	,, ,, ,,
22nd,	22,869	,, ,, ,,
24th,	32,319	,, ,, ,,
August 9th,	9,450	,, ,, ,,
14th,	69	,, ,, ,,
26th,	381	,, ,, ,,
September 29th,	690	,, ,, ,,
October 10th,	9,005	,, ,, ,,

This man's urine has been used for various feeding and other experiments with monkeys and goats by both Major Horrocks and myself, and has infected both these species of animal.

CASE X.—V. Borg, 3,567, aged 34, tailor. Had "fever" for three weeks about ten or eleven months ago.

Temperatures.—98·0°/98·4°; 98·8°/99·2°; 99·2°/98·8°; 98·6°/99·2°; 99·0°/98·4°; 98·0°/98·2°; 98·4°/98·4°.

Blood did not yield *M. melitensis.*

Urine ,, ,,

CASE XI.—F. Mallia, 3,414, aged 31, joiner. Had fever for four weeks, commencing May 1st, 1905.

Temperatures.—98·8°/99·0°; 98·6°/98·6°; 98·4°/98·4°; 98·6°/98·0°; 98·2°/98·4°; 98·6°/98·4°; 98·6°/98·2°.

Blood contained *M. melitensis.*

Urine contained this organism every day from July 3rd to end of August. During September and October it was plated twice weekly, and only failed to yield *M. melitensis* on one occasion (September 12th), when the plates were bad. The number of colonies per cubic centimetre of urine have not been so numerous as in Case IX., but have varied within wider limits as follows :—

July 3rd,	39	colonies of *M. melitensis* per cc. urine.
11th,	291	,, ,, ,,
13th,	981	,, ,, ,,
22nd,	108	,, ,, ,,
24th,	1,953	,, ,, ,,

August 16th,	6,426	colonies of *M. melitensis*	per cc. urine.	
25th,	270	,,	,,	,,
September 29th,	13,380	,,	,,	,,
October 18th,	1,017	,,	,,	,,

This man's urine also has been used for various successful animal infection experiments (*q.v.*), and up to date of writing (November 21st) has continued to yield *M. melitensis* from each of the bi-weekly samples.

CASE XII.—G. Saccett, 3,326, aged 15, rivet boy. Had two days' illness with headaches four months ago.

Temperatures.—98·8°/99·0°; 98·4°/99·2°; 98·4°/98·6°; 98·2°/98·2°; 98·2°/98·4°; 98°/98°; 98·2°/98·4°.

Blood did not yield *M. melitensis.*

Urine ,, ,,

CASE XIII.—G. Bianco, 2,565, aged 46, shipwright. Four years ago had fever for two months followed by arthritis.

Temperatures.—98·6°/98·4°; 98·6°/98·4°; 99·0°/98·6°; 98·0°/98·8°; 98·0°/99·0°; 98·2°/98·0°; 98·0°/98·2°.

Blood did not yield *M. melitensis.*

Urine ,, ,,

CASE XIV.—G. Cutajar, 3,046, aged 27, shipwright. States he has never had fever.

Temperatures.—99·8°/99·2°; 98·0°/99·2°; 98·8°/99·0°; 98·4°/98·4°; 98·2°/99·0°; 98·4°/98·2°; 98·2°/99·0°.

Blood did not yield *M. melitensis.*

Urine ,, ,,

CASE XV.—G. de Giovanni, 3,022, aged 27, shipwright. Three years ago had fever for about three weeks.

Temperatures.—98·4°/98·4°; 98·0°/98·4°; 98°/99°; 98·4°/98·6°; 98°/99°; 98·2°/98·8°; 98·0°/98·4°.

Blood did not yield *M. melitensis.*

Urine ,, ,,

CASE XVI.—G. Parlar, 3,797, aged 16, rivet boy. Had slight fever eight months ago.

Temperatures.—98·2°/99·0°; 98·6°/98·6°; 98·0°/98·8°; 98·0°/99·2; 98·0°/98·6°; 98·2°/98·2°; 98°/98°.

Blood did not yield *M. melitensis.*

Urine yielded 2 colonies of *M. melitensis* on August 3rd.

2	,,	,,	8th.
5	,,	,,	14th.
7	,,	,,	26th.

CASE XVII.—Carmelo de Celis, 3,796, aged 15, rivet boy. Had ten days' fever a fortnight ago.

Temperatures.—98·4°/100·4°; 98·2°/99·8°; 98·6°/99·2°; 99·0°/99·8°; 98·8°/100°; 98·4°/99·2°; 98·0°/99·4°.

Blood contained *M. melitensis.*

Urine did not yield this organism.

CASE XVIII.—E. Casinguena, 2,911, aged 33, shipwright. Had ten weeks' fever fourteen months ago.

Temperatures.—98°/98°; 98·2°/98·4°; 98°/98°; 98·2°/98·4°; 98°/98°; 98·2°/98·6°; 98·0°/98·4°.

Blood did not contain *M. melitensis.*

Urine yielded 1 colony of *M. melitensis* on August 4th.
5 colonies „ „ 10th.
2 „ „ „ 16th.
3 „ „ „ 19th.

CASE XIX.—A. Ghirsci, 3,111, aged 40, shipwright. Never had fever.

Temperatures—98°/98°; 98·0°/98·4°; 98·0°/98·8°; 98·6°/98·4°; 98·0°/98·8°; 98/98°; 98·4°; 98·6°.

Blood did not yield *M. melitensis.*

Urine „ „

CASE XX.—R. Mamo, 906, aged 32, assistant fitter. Had fever two years ago for three months.

Temperatures.—98·0°/98·8°; 98·0°/98·4; 98°/98°; 98·2°/98·6°; 98·4°/98·2°; 98·0°/98·6°; 98·2°/98·4.

Blood did not yield *M. melitensis.*

Urine yielded 3 colonies of *M. melitensis* on August 8th.
2 „ „ „ 12th.
8 „ „ „ 18th.

CASE XXI.—E. Agius, 2,550, aged 58, shipwright. Never had fever.

Temperatures.—99°/99°; 99·0°/99·4°; 99·8°/99·2°; 98·8°/99·6°; 98·4°/99·2°; 98·6°/98·4°; 98·4°/98·6°.

Blood did not yield *M. melitensis.*

Urine „ „

CASE XXII.—A. Gatt, 3,625, aged 49, painter. Had slight fever for about four days two years ago.

Temperatures.—99°/99°; 98·4°/99·6°; 98·4°/99·2°; 98·8/99·0°; 98·4°/99·0°; 98·8°/99·2°; 98·4°/98·4°.

Blood did not yield *M. melitensis.*

Urine „ „

Results.—Thus all twenty-two of these cases gave a marked agglutination reaction with *M. melitensis.* From three of them (Cases III., VII. and XI.) the parasite was recovered from both blood and urine. From one it was obtained from the blood only (Case XVII.), and from six (Cases I., IV., IX., XVI., XVIII. and XX.) from the urine only. All these men were up and about and in full work during the period of observation. Though all these men presented such a marked agglutination reaction as to make it a certainty they had all had Malta fever some time or other, Cases VII., XIV., XIX. and XXI. deny ever having had it at all, although from Case VII. *M. melitensis* was recovered from both blood and urine. As regards temperatures, it will be seen there was a slight rise above the normal in three of the four (III., VII. and XVII.), from whose blood the *M. melitensis* was recovered; that of the fourth (Case XI.) being practically continuously normal. While of those six from whom the urine alone yielded the parasite, the temperatures of two (Cases I. and IV.) were slightly raised, those of the remaining four (Cases IX., XVI., XVIII. and XX.) being practically normal.

The infectivity of the urines of these cases is shown by the fact that a few cubic centimetres of the urine of No. 9, injected subcutaneously into a monkey, gave rise to a typical attack of Malta fever, with recovery of *M. melitensis* from the blood and organs, and also by the successful feeding experiments on both monkeys and goats (*q.v.*), which were carried on separately by Major Horrocks and myself with the urines of Cases IX. and XI., which excreted *M. melitensis* on a remarkable scale both in regard to amount and duration.

Conclusions.—(1) That the existence of ambulatory cases is now proved; (2) that their urine contains *M. melitensis,* in large quantity and for prolonged periods, is proved; (3) that their urine is a source of infection, at least to monkeys and goats, is proved.

(*To be continued.*)

HINTS REGARDING THE MANAGEMENT AND USE OF X-RAY APPARATUS.

By Lieutenant and Quartermaster F. BRUCE.
Royal Army Medical Corps.

(*Continued from page* 511.)

Mercury Interrupters.—There are several types of these to be obtained, each having its admirers, but as the Mackenzie-Davidson and the Jet Interrupters are now most commonly used, at least in the Service, descriptive details will be limited to these.

Fig. 3.—The Mackenzie-Davidson Patent Motor Mercury Break.

By the introduction of the Mackenzie-Davidson type a distinct improvement in mercury interrupters was effected. It is no doubt a most excellent instrument, and is very easily manipulated. In its action a motor rotates a spindle having a blade fixed at its lower end which makes contact by dipping in mercury. The blade is in the form of a sector, so that contact is gradually made and withdrawn. The mercury is contained in an iron jar in the case, and forms one pole. The spindle passes through the side of the jar, and revolves in an ebonite bush to insulate it from the iron, and forms the other pole. To the upper end of the spindle a grooved pulley is fitted, and to it a band from a motor arranged on the mahogany cover communicates motion. In order to adjust the degree of contact between the blade and the mercury, an iron ring is placed in the jar. The effect produced by raising or lowering this ring will be to more or less immerse the blade by the change brought about in the level of the mercury. The position of the ring is controlled

by the manipulation of a screw on the cover. The motor is driven from a 12-volt battery, but 32 volts are required for the primary coil circuit. On the cover of the case terminals are provided for connecting the wires leading to coil and battery, and are so marked. A double switch controls the motor and primary coil circuits, so that the current can be simultaneously cut off from both. This is a wise provision, as by stopping the motor alone when perhaps the blade is in contact with the mercury, the flow of current from the battery would pass through the primary coil unchecked, and not only ruin it but the battery as well. The speed of the motor is controlled by a rheostat fixed to the side of the case, and by this means the frequency of the interruptions in the primary circuit can be altered at will.

The following brief instructions are given for connecting and working this interrupter:—

(1) Remove the band which connects the motor and spindle pulleys; (2) remove the mahogany top by unscrewing the brass thumb screws; (3) remove the iron cover of jar by removing the screws, and note screw under which the copper spring is held in position; (4) pour about 3 lbs. of mercury into the iron jar, and fill up to within one inch of top with pure methylated spirits. Best paraffin oil may be substituted for the spirit, but the mercury is more difficult to clean after use; (5) screw on the iron cover, taking care that the copper spring is correctly replaced, *vide* latter part of (3); (6) replace the band on the spindle pulley; (7) replace the mahogany cover, and fix the band on both pulleys; (8) connect the terminals marked "Battery" on cover to a 12-volt battery; (9) connect the interrupter to coil by the terminals marked "Coil" on the former, and "Mercury" on the latter; (10) connect the terminals marked "Battery" on the coil to a 32-volt battery; (11) should the coil not be provided with special terminals for connecting with a mercury interrupter, connect the pillar and spring which contain the platinum points with the terminals marked "Coil" on the interrupter. Place a piece of cork between the platinum points (because the interrupter replaces these), and wedge another piece between the hammer and end of core so as to stop vibration; (12) switch on the motor, and when it has gained a good speed switch on the coil by turning over the commutator. Should no spark pass between the points of the discharging rods, even when about two inches apart, switch off motor and coil, and add a little more mercury through the vent hole in the cover. Keep adding

more mercury very gradually in small quantities until the best results are obtained; (13) the height of the mercury in the jar is regulated by the milled ebonite screw on the cover, which when turned to the right raises the ring and lowers the level of the mercury; when turned to the left the ring is lowered and the level of the mercury is raised by displacement. The ring should be at bottom of jar before the mercury is introduced in the first instance; (14) when the tube glows very weakly, and is not improved by adjustment, this is an indication that the mercury has become foul and should be cleansed; (15) in order to cleanse the mercury, remove the covers and place the jar under a tap, allowing the water to run until the mercury appears quite bright. Stirring the mercury by a piece of wood will facilitate the process.

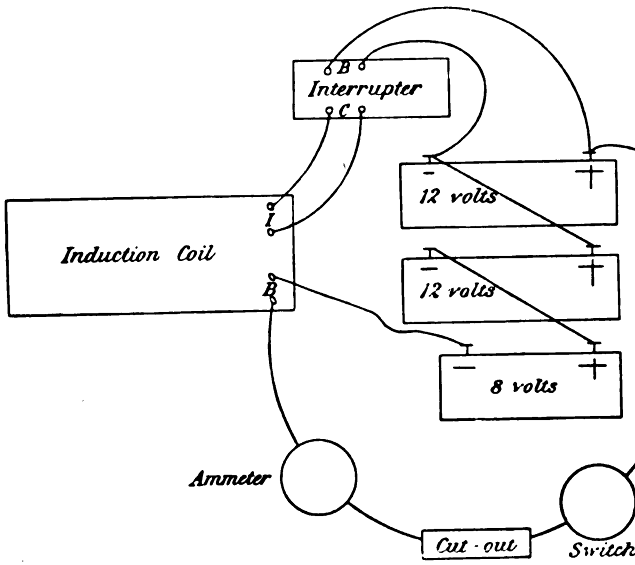

FIG. 4.

The method of making the necessary connections is shown in fig. 4.

Mercury Jet Interrupter.—This is a very powerful interrupter, and when properly used, is capable of securing the best effects from a coil. In addition, its ease of control places a great power in the hands of the operator, so that skiagraphing any part of the human body, from the bones in the hands to those situated in the deepest tissue, is rendered easy of accomplishment

by its aid. Like the Mackenzie-Davidson type a motor is provided to actuate the mechanism. This motor, which is enclosed in an iron casing, can be supplied to work from any voltage. The interruptions take place in a glass jar containing the mercury. Three graduated blades connected to a vertical shaft suspended from the cover of the jar make contact as they pass in front of a jet of mercury. By means of a pump driven at the lower end of the shaft the mercury is forced up a vertical tube. Over this tube another is fitted to slide easily up and down, and in it is pierced a small hole facing the revolving blades. These blades being triangular in shape with base uppermost, it follows that the amount of lateral surface affected by the jet depends on the posi-

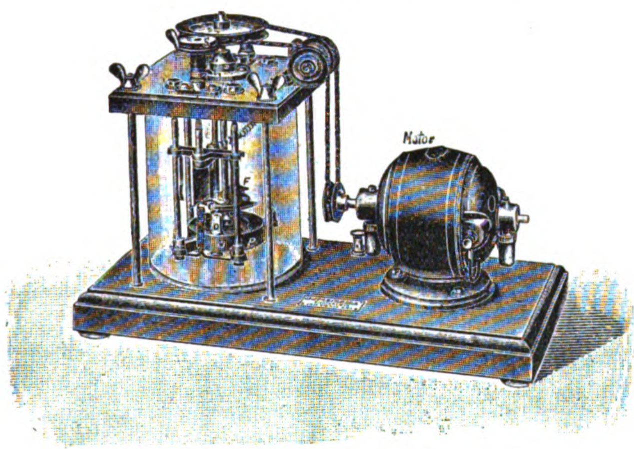

Fig. 5.—The Mercury Jet Interrupter.

tion of the small hole in the tube. By means of a milled ebonite thumb-screw on the cover, the position of the hole is regulated by moving the tube up or down, thus effecting absolute control on the amount of current passing through the interrupter. There is no churning up of the mercury similar to what takes place in the other types, and consequently it lasts longer without cleansing. It is true that a large amount of mercury is required at the start, but at the end it will be found that there has been very little waste as compared with those interrupters which churn it up into an emulsion. The Jet Interrupter is connected to coil and battery in the same manner as the Mackenzie-Davidson type. The terminals to connect with coil are placed on the cover of jar, and those to connect with battery for driving the motor are fitted to

base. In preparing this interrupter for use the following procedure is recommended:—

(1) Remove the brass arm which connects the pin on cover with the cup-shaped opening on top of shaft; (2) remove the four thumb-screws to be found on corners of cover; (3) remove the band; (4) carefully remove the cover to which the internal mechanism is attached; (5) carefully wipe out the glass jar, and replace the cover; (6) replace the four corner thumb-screws, also the band; (7) by means of a funnel, pour sufficient mercury through the hole in cover to completely submerge the pump chamber; (8) fill up the jar to cover tops of blades with pure methylated spirits; (9) pour a small quantity of mercury into the cup-shaped opening on top of shaft; (10) replace the brass arm so that the point dips into the mercury on top of shaft; (11) carefully lubricate all the bearings with the best oil; (12) turn the milled ebonite thumb-screw to lower the tube with small hole to its full extent; (13) make the necessary connections to coil and battery; (14) switch current on to motor, and separate points of discharging rods on coil to a distance of four inches; (15) start coil by turning over the commutator handle, and should no sparks take place between the separated rods turn the regulating ebonite screw to the right a little at a time until a full rich spark is obtained; (16) the mercury is cleansed in the same manner as for the Mackenzie-Davidson Interrupter.

It is very essential that all interrupter motors should be well lubricated, as they revolve at a high rate of speed, for the bearings would soon be ruined if allowed to heat from want of oil.

Motor Failures.—Provided the supply of electricity remains constant, and the bearings are well oiled, there is very little trouble to be anticipated from the motor. Often the flickering of the light in the tube is due to a slack band which does not grip the pulleys sufficiently, with the result that the motor is revolving at a higher rate of speed than the interrupter. The remedy for this is obvious. The commutator and the bearing faces of the brushes should be kept free from dirt and grease. All these will cause trouble if unattended to, and what may be only a trifling affair at first may, through inattention, develop into a serious breakdown. Should the motor suddenly cease to act, carefully examine voltage, wires, connections and brushes, and if none of these show a defect the motor should be sent to an electrician for examination, and, if need be, repair, for obviously the breakdown is serious. Failures regarding the interrupter are generally due to bad contact, resulting in an insufficient supply of current to the coil. Examine contacts, cleanse

mercury, and if the motor is not out of order these will generally have the desired effect. Very often I have known interrupters absolutely unable to supply any current, and the owners quite oblivious of the fact that the mercury being so foul formed quite a resistance in itself to the passage of any current. All binding screws should be frequently examined, as the vibration of the motor causes them to work loose.

Electrolytic Interrupter.—In a glass jar containing a solution of sulphuric acid and water, a piece each of lead and platinum are suspended from the cover to form two poles. On the cover are fixed two terminals, one from the lead and the other from the platinum. In the passage of a current from the platinum to the lead through the solution the circuit is interrupted by electrolytic action in the latter. The number of interruptions thus effected must be enormous, as the violent electrolytic action produces a shrill note. A condenser to the coil is unnecessary, probably due to the rapidity of the "makes" and "breaks" limiting the production of self-induced currents in the primary coil. The illumination of the tube is most brilliant, and the quality of the rays very effective. So powerful indeed is the intensity of the current passing through the tube that the ordinary anode would very quickly be perforated, hence tubes in which the anode is connected to a water chamber have been devised for use with this interrupter. Although ordinary coils can be made to give increased output with an electrolytic interrupter, yet those specially wound give the best results. The specific gravity of the solution should be 1·2; and it should be possible to regulate the adjustment by exposing more or less of the platinum in the jar to the electrolytic action produced in the solution by the current. In connecting an electrolytic interrupter with a coil, it is placed in series with coil and battery, and when once connected the current cannot be reversed, as the platinum in the jar must always be positive. The voltage required is greater than for other interrupters, being at least fifty volts for a ten-inch coil. This interrupter is largely used on the continent, where it finds much favour. For screen work it is excellent on account of the steady light.

Tube Holders.—These are of various patterns, but can be divided for description into two classes, *viz.*, stand and telescope.

Stand.—The short pattern is intended for use on a table, and the long to stand on the floor, and is very useful when taking a skiagraph of a patient in bed. All are of much the same construction, and consist of a weighted base to give steadiness, and an upright on which is secured an arm to hold the tube.

Telescopic.—This pattern can be fixed to a table top, and is very portable. It consists of a series of tube lengths, each supplied with a binding screw, and fitting into each other like the draws of a telescope. The lower length is attached to a clamp for fixing to the top edge of a table. Care is necessary in fixing that all binding screws are well secured, as the tendency is for the whole to drop when the tube is in position and the lengths are drawn out.

Tube holders to be efficient must necessarily be provided with adjustments to hold the tube in any position. Those constructed to stand on a table are of very limited utility, the pattern resting on the floor being the most serviceable. The holder supplied with a Mackenzie-Davidson's couch may be used for any purpose, as helpless patients can be accommodated on the couch.

The next paper will be devoted to the management of tubes.

(*To be continued.*)

A MODIFIED ARTERY FORCEPS.

By Captain F. F. CARROLL.
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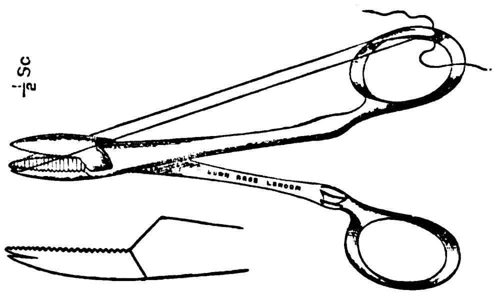
The forceps shown below has been devised to facilitate the tying of arteries situated at a depth from the surface of the body, and particularly in those cases where, owing to want of space, great difficulty is experienced in slipping a loop of ligature along the forceps already *in situ.* The writer has found them of great assistance in cranial surgery. The method of using is extremely simple. The ligature material, whether silk or catgut, is first



looped over the notch in the lower blade and both ends crossed under the spring catch on the handle where they are held tightly. The forceps can now be applied to an artery. When the vessel has been clipped the ends of the ligature should be released and tied in a surgical knot. If the knot is tightened the ligature will be found to slip by itself off the nose of the forceps on to the artery. The forceps has been made for me by Down Bros.

THE LEISHMAN BODY, THE GREGARINE STAGE OF A HERPETOMONAS.

By Lieutenant-Colonel C. BIRT.
Royal Army Medical Corps.

In September, 1904, Leishman[1] called attention to the similarity which exists between the forms of herpetomonas, a parasite of the house-fly, and the organisms he discovered in the spleen of a man who succumbed to kala-azar. Mesnil[2] also shortly afterwards pointed out that the flagellates into which Leishman's bodies develop in sodium citrate solution were more closely allied to the herpetomonas than to the trypanosome. This opinion, too, is shared by Rogers[3] in his recent contribution to the *Proceedings of the Royal Society*, entitled "Further Work on the Development of the 'Hepatomonas' (*sic*) of Kala-Azar and Cachexial Fever from Leishman-Donovan Bodies." A knowledge of this order has thus become requisite for the study of the epidemiology of "Dum-Dum" fever. This is attainable only in the form of isolated contributions published in foreign periodicals, inaccessible except in the Library of the Royal College of Surgeons of England.

It will be remembered that when blood which contains the kala-azar parasite is incubated at 22° C. with faintly acid sterile 2·5 per cent. sodium citrate solution in physiological saline fluid, actively motile flagellated organisms are developed which have a superficial resemblance to trypanosomes. Treated with Leishman's stain two spots become visible in them which are deeply tinted with the chromatin colour. The larger is termed the macronucleus, the smaller the micronucleus, blepharoplast or centrosome. A flagellum springs from the end where the micronucleus lies. The differences between the trypanosome and the flagellated stage of Leishman's body are these: (1) The trypanosome possesses an undulating membrane which is wanting in Leishman's flagellate; (2) the flagellum of the trypanosome arises from the end opposite to that in which the micronucleus is situated, while the flagellum of the

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[1] W. B. Leishman. *British Medical Journal*, vol. ii., 1904, p. 644.

[2] F. Mesnil. *Bulletin de l'Institut Pasteur*, T. ii., p. 957, December 15th, 1904.

[3] L. Rogers. *Proceedings of the Royal Society*, February, 1906, Series B., vol. 77. No. B. 517, p. 264.

kala-azar parasite has its origin from the extremity holding the micronucleus.

The name "Herpetomonas" was first applied by Saville Kent[1] in 1881 to a flagellate found by Burnett thirty years previously in the digestive canal of the house-fly. Butschli next discovered a monodine much like the above in the intestine of a free nematode, *Trilobus gracilis.* Leger[2] has made a very exact study of these and kindred organisms. Chatterjee[3] had observed a flagellate in the abdominal cavity of *Anopheles maculipennis.* His description was meagre, and his figures drawn from specimens stained with gentian violet show little structure, Leger[4-6] pursued the subject and investigated a protozoon which he found in great numbers in the alimentary canal of a female *A. maculipennis* captured in Dauphiné, France, in 1902. He named this "*Chrithidia fasciculata.*" Two forms were noted: (1) A slender flagellated body, 8 to 14 μ long, which resembled a trypanosome, except that an undulating membrane was absent and the flagellum was attached to the end near the micronucleus; (2) a shorter, somewhat oval structure, 3 to 8 μ in length, possessing a macronucleus and a micronucleus. Multiplication took place by division. The micronucleus and macronucleus divided in succession. His drawings of these are not unlike Leishman's flagellate and splenic body respectively. Leger[7-9] next traced the life history of a herpetomonas which he discovered in the intestine of *Tabanus glaucopis,* and of another from the alimentary canal of *Nepa cinerea.* The former he named *H. subulata,* and the latter *H. jaculum.* Both occurred under two aspects like the Chrithidia. (1) The "formes monadiniennes," very motile, 15 to 30 μ long, devoid of an undulating membrane, and provided with a flagellum which arose from the micronucleus end. These were numerous. Many were attached to others by their flagella and so formed rosette-like clumps. This

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[1] Saville Kent. *Manual of Infusoria,* London, 1881-1882.

[2] Leger. *Comptes rend. de l'Academie des Sciences,* March 17th, 1902, p. 662.

[3] B. C. Chatterjee. *Indian Medical Gazette,* xxxvi., p. 371, 1901.

[4] Leger and Dubosq. "On the Larvæ of Anopheles and their Parasites in Corsica." *Comptes rend. Cong. de Montauban,* 1902, p. 703.

[5] Leger. *Comptes rend. de l'Acad. des Sciences,* April 7th, 1902, p. 781.

[6] Leger. *Comp. rend. Soc. de Biologie,* 1902, p. 354.

[7] Leger. *Comp. rend. de l'Acad. des Sciences,* April 7th, 1902, p. 781.

[8] Leger. *Comp. rend. Soc. de Biol.,* 1902, p. 399.

[9] Leger. *Sur quelques Cercomonadines nouvelles ou peu connus parasites. Archiv. für Protistenkunde,* B. ii., Heft. 2, 1903. S. 181.

process of aggregation into rosettes is a common phenomenon in flagellates. Trypanosomes in blood and culture display it. The "formes monadiniennes" multiply by longitudinal division and are rapidly reproduced; (2) "formes grégariniennes." These may be regarded as developed from the former by an indrawing of the flagellum. The anterior end then fixes itself to the epithelium of the digestive canal of the host. They multiply by binary division of the micronucleus. Leger points out their striking resemblance to young gregarines, to the gregarine stage of *C. fasciculata* and *C. minuta*, an inhabitant of *Tabanus tergestinus*, and to piroplasma. The plates which accompany his paper, although published two years before Rogers cultivated Leishman's bodies *in vitro*, would serve to illustrate Rogers's report even to the rosette formation. His drawings of the "formes grégariniennes" resemble closely the splenic parasites.

Prowazek[1] has devoted himself to the study of the herpetomonas of the house-fly, discovered by Burnett in 1851, and to that of an allied species he found in the blow-fly. He has confirmed Leger's observations. He, like him, distinguishes a flagellate stage and a gregarine stage. In some of the flagellated bodies, besides a macronucleus and a micronucleus near the flagellum, he has seen two extra chromatin spots which he calls the "diplosome." Similar dots are depicted in some of Leishman's drawings. He has observed longitudinal division and rosette formation in which the flagella are in the centre. He finds that there are male and female monodines which form by their union, after loss of their flagella and reduction of their nuclei, a structure much like a Leishman body which he cells a "dauerzyst" or resting stage. The conveyance of the parasite from fly to fly can be made by cysts of two kinds, viz., those which result from conjugation and those which do not, and by infection of the ova with gregarine forms. Cysts sometimes undergo a degeneration of the principal nucleus which he terms "etheogenesis." His pictorial illustrations of this process recall the appearance of a human endothelial cell crowded with kala-azar bodies.

Pfeiffer[2] has made observations on a herpetomonas inhabiting the stomach of a pediculus—*Melophagus ovinus*—a common parasite on sheep. His description follows that of *H. subulata* given above. The gregarine forms are so numerous that they appear

[1] Prowazek. *Arb. aus d. Kais. Gesundheitsamte*, xx., 1904, p. 440-445.
[2] Pfeiffer. *Zeitschrift f. Hyg. und Infect. B.L.*, May 19th, 1905, p. 324-328.

as a thick layer lining the digestive tube. The process prints of his photographs are blurred and not very instructive.

Levaditi[1] has investigated a herpetomonas discovered in the cœlomic cavity of the silkworm—*Bombyx mori*—and has noted flagellate and gregarine stages. His drawings of the former correspond with those of Leishman's flagellates.

The following enumeration of the invertebrates in which species of herpetomonas have been hitherto found is, I believe, complete. House-fly, Blow-fly, Trilobus, Anopheles, Chironomus, *T. glaucopes*, *N. cinerea*, *Hæmatopota italica*, *M. ovinus* (sheep louse), *Pollenia*, *Fucillii*, Silkworm.

Leger,[2] while remarking on the ancestry of herpetomonas, reiterates his opinion, expressed in 1902, that certain species of this order are stages in the life history of hæmoflagellates of the vertebrates. This view is supported by Schaudinn's[3] discovery that the *Halteridium noctuæ* multiplies in the Culex in the form of a herpetomonas. Leger thinks that the ancestors of herpetomonas passed their whole existence in one insect host. Such a life cycle is still completed in the non-suctorial insects (*Musca*, *Sarcophaga*, *Pollinia*, *Fucillii*, *Bombyx*). In the blood-suckers the richer pabulum constituted by the blood of the vertebrate would cause an enormous multiplication of the parasites, and at the same time would prepare them for an existence in the vertebrate, whither they would ultimately be compelled to seek sustenance on account of the small size of their insect host. This would amount to a partial adaptation of a protozoon, primitively parasitic in the intestinal or entero-cœlomic cavity of an invertebrate, to a vertebrate host. It would explain why the herpetomonas would return to its primitive invertebrate host to effect its sexual multiplication. This conception is supported by the life history of the *Plasmodium malariæ*. Schizogeny alone takes place in the blood of man. Sexual reproduction requires the return of the parasite to the mosquito.

Rogers considers that the bug (*Reduvius*, *serratus* or *cruentus*) may be the intermediary in the transmission of kala-azar, since the Leishman body developes most readily in a faintly acid sterile medium at a temperature of 22° C. Pediculi, fleas, mosquitoes, and

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[1] Levaditi. *Comp. rend. de l'Acad. des Sciences*, T. cxli., p. 631-634, October 16th, 1905.

[2] Leger. *Comp. rend. Soc. de Biol.*, T. 58, December 24th, 1904, p. 613-617.

[3] Schaudinn. *Arb. aus. d. Kais. Gesundheitsamte*, xx., 3, 1904, p. 387-439.

other blood-sucking flies cannot escape suspicion. Leeches are thought by some to be implicated. The only evidence I can find in favour of this theory is that Bentley[1] stated kala-azar is more frequent in children than infants. Children who can walk would be more likely to encounter those pests than those of more tender age. Whatever the mediate host may be, a perusal of the literature given and a comparison of the illustrations in the text with the figures portrayed by Leishman, Rogers, Christophers, Statham, Chatterjee, render the conclusion irresistible that the authors are dealing with closely-allied organisms. That the Leishman body is a gregarine stage in the life history of a herpetomonas which completes its sexual cycle as a flagellate in some blood-sucking insect, therefore appears probable. At the same time, it would be rash to assert that all these flagellates are of one variety. There also seems no sufficient reason to assume the identity of the splenic parasites with forms morphologically similar found in tropical sore (Aleppo or Delhi boils). The fact that the former are always highly virulent and productive of a general infection which the latter do not cause, is in itself a significant difference.

The chief objection to the theory of infection by blood suckers has been the scarcity of the parasite in the peripheral blood. Success has been achieved only by examining several hundred leucocytes. One point, however, seems to have been overlooked. No systematic examinations of the blood have been made at stated intervals during the day and night over considerable periods. On *post-mortem* examination the endothelial cells of the liver and spleen are so distended with the specific bodies that they readily burst and discharge their contents. The inference is that this too must occur at times during life. It is well-known that *Filariæ nocturnæ* appear in the blood of the extremities about 6 p.m. and vanish some six hours later—a periodicity which has been evolved to permit the filaria to adapt itself to the habits of the Culex, in the body of which it must sojourn to complete its cycle of existence. Thus the gregarine of kala-azar may also escape intermittently into the peripheral circulation solely during the hours of the night for the purpose of gaining the alimentary canal of some blood-sucking insect in which it must go through its sexual phases.

Suggestions for Future Research.

(1) Periodical nightly examinations of the blood of kala-azar patients during a wave of high fever. Bentley[1] states they are

[1] Bentley. *Brit. Med. Jour.*, vol. ii., 1902, p. 875, and vol. ii., 1904, p. 655.

more infectious at this time. The cultural method, by mixing several c.mm. of the blood with sterile 5 per cent. sodium citrate solution and incubating at 22° C., would probably be a more delicate test than staining of blood films.

(2) Search for herpetomonas in all suctorial invertebrates in endemic areas. Where tropical sores prevail, flies and blow-flies should be examined for endo-parasites.

(3) Feeding experiments with the above on kala-azar sufferers, and on tropical sores, with subsequent search for herpetomonas in the intestinal canal. In the case of Delhi boil, however, direct transference of the infective material without the agency of an intermediate host is possible. Fleming[1] proved this in 1868, when he successfully inoculated himself with what he ascertained were the specific cells of the ulcer.

(4) Rogers found that freedom from bacterial contamination was an essential condition of success in the cultivation of the Leishman body. Toxins seemed inimical to its growth. Terminal infections with staphylococci, streptococci, pneumococci, dysentery bacilli, are the immediate cause of death for the most part in kala-azar.

By subcutaneous injection of killed cultures of some of these pathogenic agents, the immunity of the individual against that particular infection would be raised, and simultaneously the toxin might prove antagonistic to the kala-azar invasion. A trial of this mode of treatment seems justifiable.

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For a Comprehensive Summary of the Work on the "Parasites of Culicidæ," *see* Dyè, *Archives de Parasitologie*, T. ix., 1905, p. 1.

Some reference to the herpetomonas may be found in Laveran and Mesnil's "Trypanosomiasis," and S. Prowazek, *Arb. aus d. Kais. Gesundheitsamte* 22, 1905, p. 351-395.

[1] J. Fleming. *Army Medical Reports for 1869*, vol. xi., p. 511.

LATRINE INFECTION IN THE ENTERIC FEVER OF INDIA.

By Lieutenant-Colonel D. WARDROP.
Royal Army Medical Corps.

There are few medical officers now who do not regard latrine infection as a most potent factor in the causation and spread of enteric fever in Indian cantonments. That the disease is water-borne no one will deny; but every observer in the Tropics has had to deal with epidemics where the water supply was above suspicion, and where, after eliminating every possible known cause, he is driven to believe that the attacks do not arise from a common origin, but are communicated one to the other. By a further process of elimination it is rapidly being established, in India at any rate, that the seat of infection is the latrine or urinal.

In the Journal for January, 1905, the history of an epidemic that occurred in Rawal Pindi was published, and the writer clearly proved that from three cases occurring in a draft, contracted on the line of march up country, the epidemic spread, not only through the draft itself, but to the entire regiment to which the draft belonged. He also proved that the source of infection was the latrine, and that as soon as this was fully recognised and the latrines rendered innocuous, the epidemic was arrested. The history of a similar series of attacks which occurred in Rawal Pindi last October is further evidence in proving that latrines in India are a most potent means of spreading enteric fever. The Wiltshire Regiment arrived from the Murree Hills at West Ridge Barracks about the middle of October, and on the 24th of that month were joined by a large draft from England, which, for the purposes of segregation, was put under canvas and completely isolated from the rest of the regiment. This precaution was arranged in order that, in the event of any of the men contracting enteric fever on the journey up country, the disease should be confined to the draft. On November 16th a case of "fever" was admitted from this draft to the Section Hospital at West Ridge. The case was looked upon by the medical officer in charge as probably malarial, and, as no pathognomonic symptoms had appeared, the draft was allowed to go into barracks on November 24th, the month of segregation having expired. On November 27th and the two following days three more men reported sick with high temperatures. Enteric

fever was then suspected, and, in the first case, the diagnosis was confirmed. During the first three days of December five more cases were admitted from the draft, and on December 5th, thirteen days after the draft had been allowed to go into barracks, a bandsman of the regiment was admitted with the disease. This man came from a bungalow in which none of the affected draft had been distributed, but which had a latrine and urinal common to it and another barrack in which men of the draft lived and from which cases of enteric fever had been admitted. During September eleven men of the draft and three others were admitted to hospital with this disease from various bungalows in the lines. In the meantime, vigorous action had been taken; the draft had been sent back to camp, the latrines thoroughly disinfected, the receptacles and night-soil carts sterilised by heat, and, what is, I believe, the most important factor in the stamping out of this disease in Indian cantonments, arrangements made by which the dry-earth system was temporarily abolished and the latrine pans kept partially filled with a solution of carbolic acid, and emptied and cleaned after each time of using. After December no further attacks occurred, twenty-four cases in all having been admitted to hospital.

Now, the history of this epidemic points strongly to spread by latrine infection. The first case, admitted on November 16th, possibly contracted the disease before arrival in the station. In any case, the patient could not have contracted it in the segregation camp, for West Ridge has always been singularly free from this disease. The subject of this attack, which was of an extremely mild nature, doubtless infected the camp latrine and urinal badly before he came to hospital. No other man was attacked for eleven days, when, as above stated, cases began to occur rapidly in the draft, all apparently infected about the same time. Then thirteen days after the affected draft had been distributed about the barracks we have a case occurring, not of the draft and not living in a bungalow with any of them, but in a man using the same latrine and urinal as were used by infected men. This is fairly clear evidence that it is the latrine that is our greatest source of danger in epidemics of enteric fever in India. If more is wanted, we have the fact which was firmly established in the epidemic alluded to in the January number of the Journal for 1905, that, as soon as the latrines and urinals were vigorously tackled and all infection from that source rendered impossible, the epidemic stopped. One more point might be adduced to show that all these cases spread from the first man attacked. The case was a very

mild one, running a fairly typical but unusually gentle course, and giving a positive reaction to Widal's test. The whole series of cases were of an exactly similar nature. All gave positive reactions to Widal's test, but, with one exception, there was not a severe case among them. The exception was in a soldier of over five years' service, who died shortly after admission to hospital from perforation.

An interesting parallel occurred to the above epidemic in a draft of the Royal Irish Fusiliers who were in segregation camp in Church Lines during the same period as the draft of the Wiltshire Regiment were at West Ridge. A young soldier reported sick with "fever." He was admitted, and, as the temperature had not fallen in twenty-four hours, the case was looked upon as "suspicious," and immediately the camp latrine and urinal were disinfected and antiseptic solution substituted for dry earth. The case proved to be one of enteric fever, but no other case occurred.

The lessons learned during the past year in Rawal Pindi as to the prevention of the spread of this disease are, to treat any case of continuous fever occurring in a young soldier as a suspicious one, to act at once and vigorously, and that all such action be directed to perfecting the sanitary condition of the latrines and urinals, and to give up using the dry-earth system in favour of an antiseptic one. Day by day the fact is being forced upon us in India that our greatest sanitary need is a more perfect latrine and a better disposal of the night-soil. When we obtain that, enteric fever will not be the scourge it is at present.

THE GOUX SYSTEM AND ITS APPLICATION TO INDIA.

By Captain R. J. BLACKHAM.
Royal Army Medical Corps.

The disposal of sewage is a burning sanitary question of the hour in all quarters of the globe, but nowhere more so than in India. Indeed, it has recently been stated that conservancy is *the* most important matter in connection with the health of British troops in Indian cantonments. In a report on the subject, dated April 25th, 1905, the Secretary to the Principal Medical Officer, His Majesty's Forces in India, states that "daily evidence is being brought forward that the bearing which a badly constructed conservancy system has on the causation and spread of enteric fever amongst British troops is of greater importance than the risk of infection through food and drink." Moreover, the whole question of removal and disposal of excreta is fraught with great difficulty, and, in the present method of earth disposal, is accompanied by nuisance, soil pollution, and danger to health at every step. That the use of the earth system is, in itself, a menace to health is evidenced by the much lower incidence of enteric among officers, women and children, using commodes, than among the rank and file obliged to use earth latrines, the atmosphere of which may be polluted with typhoid-laden dust. Recognising the difficulty of carrying out the present so-called dry-earth system and the necessity for preventing infection by flies and other insects, Lieutenant-Colonel H. K. Allport, R.A.M.C., was, I think, the first to point out that the existing state of things might be remedied by the reception of fæces in perchloride of mercury solution (Journal of the Royal Army Medical Corps, vol. iii., p. 280, September, 1904). This would certainly prevent infection by flies, but the wholesale use of a powerful poison such as corrosive sublimate is open to objection. As a modification of this, Major Weir, R.A.M.C., late Sanitary Officer of the London District, has suggested a method in which a deodorant is used in the latrine pans, which are removed each day to a central depôt, where their contents are emptied into a tank and sterilised by steam. The resulting material is disposed of by burial or distribution over land, and the pans are disinfected by steam at the depôt before being returned to cantonments.

Captain Blake Knox, R.A.M.C., proposes, in the communication above referred to, a system on the same principle, which seems to have much to recommend it. He suggests the reception of

excreta in iron pans, provided with covers, each of which is large enough to receive twenty-five pounds weight of excreta, which is the average amount of fæcal matter voided by 100 men in twenty-four hours. These pans should contain a sufficient amount of a disinfectant to cover the dejecta and deodorise it. The disinfectants he suggests are:—

Freshly slaked lime	1 part in	8 of water.
Creolin	,,	150 ,,
Izal	,,	100 ,,

The pans should be replaced at night by clean ones and their covers fastened with thumb-screws. They must then be taken on a cart straight to the trenching ground for disposal of their contents, and must be thoroughly disinfected before their return to cantonments. By this method it is claimed that the excreta are thoroughly disposed of, flies kept away, the use of filth carts and latrine receptacles abolished, and the pollution of the soil incident to filling the "ironclads" done away with.

Both these plans, however, involve a considerable amount of expense, as mechanical plant would be required to disinfect the pans, and special transport would be required to convey the pans backwards and forwards from the depôt. I would suggest the simple reception of the excreta in solutions of a non-poisonous higher phenol, such as cyllin or izal; removed in the present receptacles after thorough admixture with the disinfectant; and disposal in deep pits, as the nitrifying organisms on which we rely to resolve organic matter into simpler inorganic material in a trench system would be inhibited, if not destroyed, by the presence of the large quantities of disinfectants. There is no more risk of infection of the soil by leakage and splashing from the present style of filth cart than there would be in the proposed system of carting covered pans of considerable size, as the Indian *mehtar's* idea of a closely-fitting cover might be very different to that of the inventor's.

All the suggestions which have been put forward, even in Captain Blake Knox's lengthy and valuable report, however, only refer to the plains of India, where final earth disposal is possible; but in the hills land is not available for this purpose, and a water carriage system, with its attendant biological treatment, which *might*, as Captain Knox says, be possible in a few places on the plains, is always out of the question on the Himalayan slopes. Final cremation must, therefore, be the aim of sewage disposal in the Indian hills, and some method of receiving excreta in such a manner that it would be primarily deodorised and finally readily

burnt is urgently required, especially as under the enlightened policy of Lord Kitchener the vast bulk of the European Army in India will, in the future, spend the hot weather months in the hills.

Looking round for some practical method which might be adapted to Indian requirements, I found the "Goux System" flourishing in a large English borough, and as it appears to me to be the only one adaptable to Indian requirements, I looked it up

Fig. 1.—Emptying the tubs at the Docks, Stony Royd, Halifax.

in the modern text-books on hygiene, but found all but the briefest reference to it has been crowded out by accounts of its younger rivals, the precipitation, septic tank, and contact bed systems. This being so, I placed myself in communication with Dr. J. T. Neech, the Medical Officer of Health for Halifax, and through his courtesy am enabled to submit the following brief account and the accompanying illustrations, taken during the actual working of the system, to the readers of this Journal.

The "Goux System" was invented by Pierre Nicholas Goux,

Agricultural Proprietor, of Paris, and consists in the reception of excreta, free from ashes and household refuse, in pails or tubs lined with an absorbent material. The tubs are made to slip under the seats of closets of very simple construction. They are removed at intervals, varying from three to ten days, in covered vans of special pattern, one of which is illustrated (see fig. 1).

The tubs are taken to a depôt at Stony Royd and emptied into special docks, as shown in the illustration. The heaps of manure are allowed to stand for two or three days to allow the water of the urine to drain away into special surface drains. Most of the ammonia of the urine remains in the absorbent material, and the result is a combination which, Dr. Neech says, "has no rival as a fertilising agent, except the richest Peruvian guano." When sufficiently dry the manure is loaded on to canal boats. It finds a ready sale at a fair price to the farmers of the district, and is accepted at crude manure rates by the railway and canal companies. This is a very important point in its disposal, as one of the greatest drawbacks to the disposal of sludge in the various precipitation processes is, that railway companies insist on regarding sludge as a patent manure, and charge seven to eight shillings per ton per mile for it, whereas horse-dung is carried for one shilling per ton per mile. "Goux" manure is not more offensive than ordinary stable manure, which is carted through the streets of all country towns at every hour of the day, without let or hindrance. The empty tubs are washed, and are then taken to the packing shed to be refilled with absorbent material. Many kinds of absorbent material have been used at various times; and, curiously enough, few of the text-books on hygiene give a correct description of the material which has now been in use for a number of years, viz., woollen shoddy, a form of trade refuse more readily obtainable than most other absorbent materials in Yorkshire. Whitelegge, for instance, erroneously states that the pails are lined with compressed peat ("Hygiene and Public Health," p. 187). Shoddy is used because it is found to absorb no less than 80 per cent. of the liquid excreta. The process of filling is done by placing a tin in the receptacle and then filling in the shoddy. The mould is then replaced by a cylinder or shell in position until the receptacle is placed under the seat of the closet. Fig. 2 illustrates the process of filling. When the pail, or "tub," as it is technically termed at Halifax, is placed in the closet, the shell, above referred to, is taken out by the collector or driver and brought back to the works to be put into the next lot of receptacles.

This system has been in use in Halifax since 1870, to the exclusion of all other methods of disposal of excreta, and Dr. Neech reports that he finds it works better than water-closets, especially in the case of slum property. The extent of the area over which the system is worked may be gathered from the fact that 17,428 tubs were in use on December 31st, 1904, and the number of loads of manure collected during the year 1904 was 6,518. So much for the system; we have now to consider its application to India.

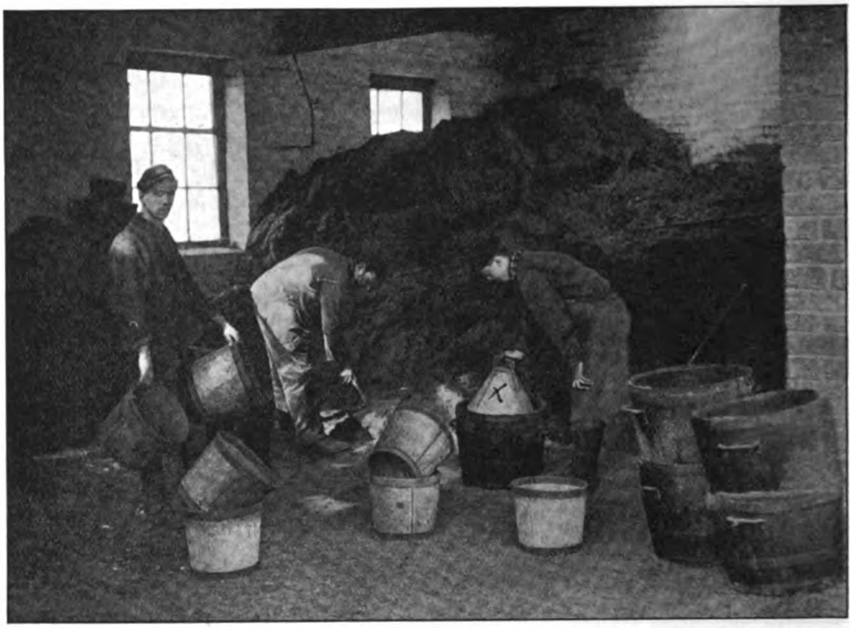


FIG. 2.—Lining the tubs with absorbent material. The special mould is marked with a X.

Everywhere in the Himalayas, deodars and other pine-trees abound, and the side of the hills are carpeted with pine needles to a considerable depth in the vicinity of every hill cantonment. These needles are not put to any economic purpose, and are allowed to gradually decompose and blend with the rich humus of the mountain slopes; but they could, with advantage, be used to replace the woollen shoddy in a modified "Goux" system." At present fæces and urine are received in coarse, ill-glazed earthenware vessels, and not treated in any way. The filth is deposited in receptacles and carted to an incinerator, where it is mixed with household refuse and burnt. As everyone knows who has served in Indian hill stations,

grave nuisance often arises from the exposure of fæces to a tropical sun, and, as we have seen, flies are allowed to carry infection from the numerous enteric fever convalescents always to be found in hill sanatoria, many of them suffering from typhoid bacilluria. Here no treatment by liquid disinfectants can be considered, as it would increase the amount of liquid filth, and thus the difficulty of cremation, which is a perennial problem with the scavenging staff of a hill station. Solid disinfectants are also out of the question, as those which are efficient have a mineral basis, or are prohibitive in price, while lime, which would fulfil most requirements, is useless when kept, and of course cannot be burnt. We have, however, only to go to Dame Nature for cheap, efficient, inflammable and inoffensive material for treating the excreta. Pine needles are ubiquitous, cleanly and fragrant. They can easily be reduced to a coarse powder, and if placed in the bottom of each *gumlah*, or receptacle, and a small quantity sprinkled over the excreta by each soldier immediately after the closet is used, nuisance and infection by insects would be prevented and the discharges very considerably deodorised. Moreover, the provision of an absorbent material in the receptacles would almost entirely prevent the pans being soaked with filth, and would thus obviate the necessity of keeping a double set of latrine pans in the manner advocated by Surgeon-General R. H. Quill (Journal of the Royal Army Medical Corps, vol. iv., No. 6, p. 809). Saw-dust would, of course, act equally as well as pine needles, but saw-mills are not common in the Simla or Murree Hills; at any rate, saw-dust would cost money, whereas pine needles can be had for the labour of gathering; and native labour is cheap enough in India to make this a very small item, considering the thousands of rupees which must be spent if a chemical disinfectant is used.

To sum up, we have, I think, in powdered pine needles an efficient means of treating excreta in the Indian hills. The material is (1) cheap and innocuous, (2) easily obtained, (3) deodorant, especially if mixed with fir cones, (4) very readily burnt, (5) somewhat absorbent. It, therefore, I submit, fulfils all requirements necessary for the special mode of conservancy under consideration.

The system was tried for a few months at Dagshai in the Simla Hills on the recommendation of Lieutenant-Colonel W. Keays, but for some reason has been completely lost sight of.

I am indebted to Dr. J. T. Neech, Medical Officer of Health, County Borough of Halifax, for the photographs.

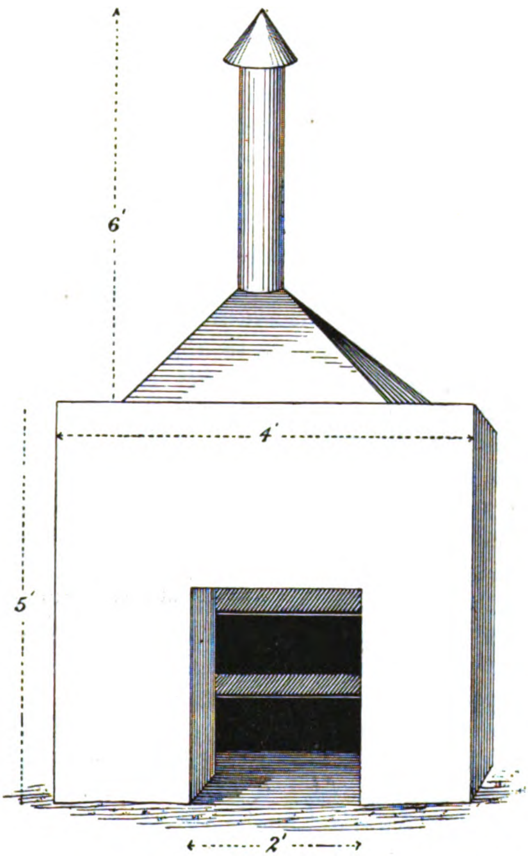
AN INDIAN INCINERATOR.

By Lieutenant-Colonel H. A. HAINES.
Royal Army Medical Corps.

In this, the day of the sewage problem, the following account of a method evolved in an Indian hill station may be of interest, as it was worked with but small help from Government, and practically without expense. It may be premised that the official system in force in the spring of 1905 was the removal of excreta in buckets and its burial in shallow trenches, which, after filling in, had their surfaces planted; every stage being marked by dry earth—that is, *dust*—supplying microbes by the million for people to inhale. On account of the danger of the filth being washed out of the trench by the heavy rain in the monsoon in the hills, the measurements of the "Allahabad system" are not strictly adhered to, but the trench is dug deeper.

Early in the year, the question of the installation of an official incinerator had reached the stage of discussion of types, but as my tenure of the Station Hospital was only for two summers, the occasion appeared opportune for some independent experiments. On making a preliminary survey of the ground, a building of stone and mud was discovered on the hill side, some thirty feet below the general level of the hospital. On the Royal Engineers' plan it was marked "bug-boiler"; it, however, had no boiler, but a fireplace and an iron grating, over which was a vacant space where a boiler could be placed of about six cubic feet capacity. This was something to begin with, so we tried to burn some sweepings in it, and found that the draught was insufficient to burn anything except dry firewood. The Royal Engineers were then appealed to, and at a cost of ten shillings or thereabouts, we had four and a-half feet of iron stove-pipe put up, having a pyramidal base, with one side of the pyramid made to open as a door, and a second grating eighteen inches above the first. This worked very well, so we started with a bucketful from a latrine, and all the sweepings and waste paper which could be found, mixed together and put in on top, and below the grating a fire of dry wood. This charge was eventually reduced to ashes, though it took a very long time, as the mass was too solid to burn freely. We then got some wood shavings from a carpenter's shop and managed better, but this supply soon ran out; then we tried stable litter, which, in India, consists, besides horse-dung, chiefly of grass roots; some was

brought out and mixed with the latrine stuff and found to burn well. As there were five horses in the hospital stable, sufficient litter to mix with all the excreta was obtainable every day. The excess of liquid was strained off into a pit of loose earth near at hand, but with a boiler in the wall of the incinerator, this could easily be sterilised, which would allow of its general use in the garden.



All urine and slops from the enteric ward were boiled in an ordinary wash-tub. The excrement from about one hundred Europeans, the solids from the enteric ward, and the rubbish of the whole hospital, were put through the incinerator daily. The time taken for combustion was about eight to ten hours, but the fire needed attention for only an hour or so, as by that time the charge of litter and ordure caught fire and burned away by itself. A thorn

bush which overran the hill sides and needed clearing away, was found very useful, as it burnt when newly cut in the green state (*Berberis lycium*). The stable litter is indispensable, both for mixing with the wet mass to make it capable of ignition, and for its remarkable effect in destroying absolutely every trace of offensive smell. The diagram explains itself. The ash raked out from beneath the lower grating was disposed of as a manure in the garden.

One urinal had been built next a cook-house on the opposite side of the bungalow from the latrine. With the object of removing it from this unwise proximity to the kitchen, and also to diminish the amount of urine passed into the latrine pans, the urinal was moved to a position next the latrine; notwithstanding this improvement, the weight of ordure from 100 people was over 200 lbs. daily. I am convinced that the four ounces which the text-books give as the average weight of an adult's fæces in twenty-four hours is much too low an estimate. The dry earth in the pans, of course, had to be discontinued, and a disinfectant was required which would not cause trouble in the incinerator. In kerosene oil of cheap and crude quality is to be found, probably, an ideal substance for use in latrines; among other advantages, it is oily, and hence facilitates the cleansing of the pans; it is distasteful to flies, and keeps the latrines practically free from these microbe-carriers; it keeps the pans aseptic, and assists in the combustion of the ordure. The use of kerosine oil had previously been suggested by the Principal Medical Officer, Colonel Hamilton, for sprinkling the floors of latrines and urinals to keep down dust and harden the ground where the floor was only earthen, as had been done for motor-car roads. This result is satisfactorily achieved with a light sprinkle once a week, and besides, it has the great advantage, as remarked above, of keeping away flies, and this to such an extent that visitors have said that "the only places free from flies here are the latrines."

Finding that the patients' latrines were easily dealt with, we next turned our attention to the native staff, and added the stuff from a closet used by about forty people of all ages. But here a greater difficulty presented itself, namely, that the Indian washes himself after defæcation, so that there was much more liquid in the buckets, and our stoker declared that he could not burn it unless some of the liquid was separated. We, therefore, induced the barrack-master to part with a condemned wash-tub. In the bottom of this we had holes pierced about a quarter of an inch in diameter

(this size we found in use to be too large). A pit of about nine cubic feet was then excavated and filled up with loose humus; over this was placed the tub with some stable litter in the bottom; it was then filled with the pan contents, and the excess liquid strained slowly off; the solids left behind were then treated as before and found to be combustible.

This method of treatment was suggested by Colonel Hamilton's plan of earth urinals for troops, which he had practised with success before, and which we now introduced in the station hospital. Till August, 1905, the saw-dust system had been in use and worked well, but the supply of saw-dust was scanty and uncertain, and hence impracticable for any large number of troops. The earth plan is as follows:—A cube of ground is dug out, measuring about three feet each way, a coping of stone, slate or brick placed around the edge, and the pit filled up with loose earth free from stones; then a little kerosene oil sprinkled on the top and edges, and the urinal is ready. One of this size is suitable for about fifty men. On account of the rains, some of these were placed under cover; but one under the shade of a fig tree did equally well, though it was once partially washed out by a heavy shower. After a month's use these urinals were quite sweet, but as we required manure, the earth, as rich as guano, was taken out; the pits were then used, and when a smell became perceptible, a layer of fine earth, two inches deep, was put over the floor. This did not begin to smell for about ten days, when another layer of earth was put in. A pit can thus be slowly filled in to the top; then, if manure is wanted, the filling is removed and the process repeated, or a fresh pit may be dug. The kerosene oil imparts a dark metallic tinge to the earth, and the mixture kills not only microbes, but tender plants and seedlings. The plan in working is simplicity itself, and besides providing a valuable manure, saves much labour in carriage of stuff in smelly vessels along public roads, which, in a hill station, is generally unavoidable; but the mixture being always damp, as well as coated with kerosene, there is no "live" dust to blow about, there is no smell, and there are no flies.

The amount of kerosene used every month is twenty-four gallons. This is applied to the floors of two large latrines and on four earth-urinals; each latrine has ten compartments, and the pan in each has half an ounce of oil put in it, say seven to ten times daily for one hundred people. The oil being almost useless for illumination is not stolen by servants, and the floor, even when wet, cannot be ignited with a lighted match, so there is no danger of fire.

SOME NOTES ON CONTINENTAL SURGICAL PROCEDURE.

By Captain F. F. CARROLL.
Royal Army Medical Corps.

Part I.

I have ventured to publish these short notes on the practice of some Continental surgeons in the hope they may be of interest to brother officers. They are chiefly drawn from the teaching of the Surgical Kliniks of Vienna and Bonn.

Anæsthesia.[1]—A rapid method of producing general anæsthesia by ether, known as "Ätherrausch," is much employed in Austria and Switzerland for the performance of minor operations, reduction of dislocations, and the setting of fractures, &c. A metallic mask very similar in construction to the facepiece of an Ormsby inhaler is used; 20 cc. of ether, to which two drops of ol. pini. pumol have been added, are poured upon the sponge. The patient is directed to take several deep inspirations (five to ten). The mask is then applied to the face, over which it should fit tightly, and the central opening almost closed by the hand. After a few minutes a second quantity of ether (20 cc.) is again poured on a sponge and the patient narcotised to the period of excitation. The mask is then removed and the patient allowed to take five to ten inspirations. On reapplying the mask it will be found in the great majority of cases that after a few minutes complete anæsthesia is induced, although sometimes a third 20 cc. may be required. The duration of such an anæsthesia is about ten minutes. The advantages claimed for this method are:—

(1) That owing to the admixture of ol. pini. pumol the disagreeable taste and smell of ether are not perceived by the patient; (2) that partly to the above volatile oil and partly to the short duration of the anæsthesia, bronchitis and pneumonia are almost unknown as sequelæ; (3) it is very suitable for elderly people; (4) after-effects, such as headache, vomiting, &c., are very rare; (5) the patient is able to walk about again in usually half-an-hour; (6) absence of danger.

Spinal Anæsthesia.—This method, although first employed so far back as 1885 by Leonard Corning, in America, had fallen into almost complete disuse until the last three or four years, when, owing to the work of Tuffier and Cathelin, in France, and Bier, in

[1] Dumont. *Handbuch der Allgemeinen und localen Anæsthesie*, S. 50.

Germany, it has again come to public notice. Cocaine, tropa-cocaine, and B. eucaine have been largely employed, but are at present almost all abandoned in favour of stovaine.[1] The solution for injection is prepared in the following manner (Bier): ·05 gramme of stovaine is dissolved in 2 cc. of sterile water, to which adrenalin chloride, ♏ii., has been added. The liquid is then poured into a small glass tube and sterilised by boiling. The end of the tube can either be plugged with cotton wool or sealed in a flame. It is now ready for use and is stated to keep, especially if sealed, for a long period of time.

The technique of the injection is as follows (Bier) : (1) The patient is made to sit on the edge of the operating table and directed to bend forward as much as possible (Tuffier position) ; (2) the skin of the patient's back is then most carefully cleaned and prepared as for an operation with hot soap and water, ether, alcohol, and finally, a solution of hydrarg. perchlor., 1 in 2,000 ; (3) the edge of a sterile towel applied from the highest point of one iliac crest to a similar position on the other will indicate the interval between the fourth and fifth lumbar spines ; (4) the needle of the syringe, which should be 9 cm. long and 2 mm. in diameter, and provided with a stilet, is now introduced between the spinous processes of the lumbar vertebra in either the second or third interspace, taking care to keep in the middle line. If the patient is very sensitive the skin may first be frozen with an ethyl chloride spray. The needle is now thrust forwards and slightly upwards until the tough ligamentum subflavum is reached. On piercing this structure the needle will be felt to move forward quite easily, and at a depth of 6 to 7 cm. will, in the great majority of cases, be found to have entered the subarachnoid space. The stilet should now be withdrawn and cerebro-spinal fluid allowed to escape ; it will spurt out if the patient is directed to cough. The quantity lost up to one or two cubic centimetres is immaterial ; (5) the syringe filled with the solution of stovaine is now screwed on to the needle and the liquid slowly injected, and the instrument withdrawn ; (6) the patient should then be placed in the recumbent position on the table, which meanwhile has been tilted head downwards. Anæsthesia begins in about one to two minutes, and is usually complete in six to eight minutes.[2]

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[1] Sonnenburg. *Deutsche med. Wochenschrift*, March 2nd, 1906.

[2] *Note.*—The following accessories for use in spinal anæsthesia may be obtained direct from F. A. Eschbaum and Co., Bahnhofstrasse, Bonn. a Rh. 2 cc. syringe

Cases in which Spinal Anæsthesia is Indicated.[1]—(1) Old people; (2) in patients much weakened from various causes; (3) in cases in which general anæsthesia is contraindicated; (4) on field service.

Cases in which Spinal Anæsthesia should not be used.—(1) All spreading infective processes; (2) In all acute septic cases, *e.g.*, septic arthritis.

After-effects.—Bier in his latest statistics gives the results of 102 successive cases of stovaine anæsthesia. In only eight were after-effects noticed, consisting of vomiting seven, and slight collapse one.

TECHNIQUE.

Ligatures.—The Claudius-method[2] of sterilising catgut has now stood the test of three years' experience, and appears to give universal satisfaction. It is extremely simple and cheap. The procedure is as follows :—

(1) Commercial raw catgut is wound on glass reels; (2) these are then placed in a solution of potassium iodide 1 part, iodine 1 part, water 100 parts. This should be made by first dissolving the iodide of potassium and then adding the iodine finely powdered; (3) the reels are immersed in this fluid for eight days, at the end of which time the catgut is quite sterile and fit for use. It can be kept in this solution indefinitely.

Preparation of the Hands before Operation.—The following, which is the routine pursued in the Klinik of von Eiselsberg, in Vienna, is an example of perhaps one of the best foreign methods: The hands and forearms are first washed with ordinary soap in hot running water for ten minutes, by the hour glass (one of which is fixed to every wash-hand-stand), a sterile nail-brush being at the same time employed to thoroughly cleanse the skin. They are next washed with soap spirit and hot water for five minutes, in alcohol for three minutes, in a solution of hydrarg. perchlor., 1—2,000, for three minutes, and finally rinsed in hot normal saline solution.

The Wearing of Gloves.—The opinion of Continental surgeons

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with two needles and stilet complete, Mk. 21.00. Stovaine: one box containing six phials 2 cc. each, Mk. 3.60.

[1] Bier. *Archiv. für Klinische Chirurgie*, Bd. 77, S. 199. Also see Bier und Dönitz. *Münch. med. Wochenschrift*, No. 14, 1904. Bier. *Vortrag. gehalten am Chirurgie Kongress*, Berlin, 1905. Dönitz. *Archiv. für Klinische Chirurgie*, Bd. 77, Heft 4.

[2] Claudius. *Deutsche Zeitschrift für Chirurgie* Bd. 64, S. 489.

appears to be unanimous, that while the use of india-rubber gloves in aseptic cases is a matter of individual taste, they should always be worn in septic cases, not to protect the surgeon but to keep his hands surgically clean. Some operators, of whom von Eiselsberg is an example, follow Mikulicz in wearing white cotton gloves for aseptic cases, and change them frequently during the operation.

Sterilisation of Dressings.—A very simple method is employed in the Klinik of von Eiselsberg, in Vienna, for determining whether dressings, towels, gowns, &c., when treated in the steriliser, have really reached a temperature of 100° C. Slips of common, unsized paper are first dipped in a solution of starch, dried, and then immersed in tincture of iodine. When dry they are a deep blue-black colour and are ready for use. These strips are placed among the dressings, and will be found to turn quite white if the heat in the sterilising chamber has reached 100° C. They form a very useful check on the person in charge of the steriliser, and from personal experience can be strongly recommended.

NOTES ON PRESERVING HEALTH OF SOLDIERS IN THE FIELD.

By Brevet-Lieutenant-Colonel G. S. McD. ELLIOT.
Royal Engineers.

Introductory.

The Regimental Officer.—It is the Regimental Officer in the first place, and mainly the Regimental Officer, who has it in his power to keep his men in good health. Professional advice and medical or surgical assistance the Medical Officer can and does supply, but it is on the daily and constant care of the men, and in the education of them in right ideals and right methods that success eventually depends. One so often hears the remark when discussing some innovation that of itself is eminently necessary and desirable, "You know the soldier, you will never get the men to do that." The whole tone and spirit of this remark is one that can never be acquiesced in. The British Regimental Officer, as regards his personal influence with the men, is unequalled. Whatever he is firmly convinced is practical, and for the good of the men, and the credit of his corps, he will get his men to do heartily and readily. One often hears that officers take a pride in their men not falling out on the march. When they realise that a low percentage of sick is a sign of efficiency too, and that it is largely in their hands to keep the percentage low, they will devote the same earnestness and energy to keep the men fit and in good condition to stand hardship and fatigue that they now do to any other branch of their training. In short, the first thing to do is to educate the officer in the simple, common-sense, well-known rules of health. Men take a pride in understanding and looking after their horses and dogs, but they appear to consider human beings as too self-willed or too complicated creatures to be dealt with by anybody but a doctor.

Value of Experience Gained in Sport.—Those who have gone in for sport or travel in rough countries have learnt a good deal by their own experience, and in their own persons. Most of them realise more or less dimly that every officer should study, and use the experience so gained to enable him to keep men and beasts under his charge in good condition and spirits, and to know how to get the last ounce of work out of them without impairing their efficiency.

Necessity of Training Men to be Hardy.—Valour and discipline are indispenable to a soldier, and in these our men are unsurpassed, but without hardihood, without the ability to bear heat and cold, hunger, thirst and fatigue, of what use are they? However willing

the spirit may be, if the flesh is weak it will sooner or later assert itself in spite of the stoutest resolution; and when it does, the longer it has been resisted the more complete will the breakdown be. If we want an ideal of hardihood we have not far to go. The crews of fishing boats and sailing ships who ply their calling in winter do so under conditions of hardship and peril that few of us realise. Their bodies have been hardened by life-long exposure to hard conditions. It is idle to expect that our town-bred soldiers can ever emulate the endurance of men like these. But it has been recognised from earliest times that it is the duty of a good soldier to learn to "endure hardness."

Not to Give Way to Thirst.—One of the first things the soldier has to learn is not to give in to the inclination to drink when he is thirsty. Assuming that the men start on a march on a hot day with full water-bottles, for how long do they remain full? This is one of the first and most obvious tests of endurance. A man who drinks readily and freely will not go far. And yet it is not to be wondered at that the British soldier is not long in emptying his water-bottle.

Importance of Diet.—There was a time when I used to wonder at the soldier's fondness for pickles. But a time came when I ceased to wonder. I had found out I had developed an inordinate fondness for pickles myself, and it was due to ill-cooked, tasteless food, with no variety to it, served in an unappetising way. One craved for something with a taste in it. Had beer and tobacco been available, I would have liked to make my meal principally of them, as many of the older soldiers do, to the detriment of their health and powers of endurance. The obvious remedy, if we wish to keep men from resorting to thirst-provoking condiments and condition-destroying quantities of beer, is to supply them with wholesome, appetising food of sufficient variety; and further, they must learn to cook for themselves, and be resourceful in making tasty dishes with the materials they are likely to have at their disposal in the field, and with the appliances they would have in the field. Frenchmen, Turks, and in fact soldiers of most other nations can do this, but till lately it has been regarded as below the dignity of the British soldier.

Hardihood of Russian Soldiers.—When I was on my way from Erivan to Batum one November, I passed a Russian barrack near the former place about sundown. The men were carrying their cots out into the open air. I was told that they were going to sleep out of doors to harden them. I remember, too, one morning in Kars, in March, when the country was covered yards deep in

snow, seeing the garrison marching out at half-past seven in the morning. It was snowing and blowing pretty hard, and continued to do so for some hours. At half-past three I saw them returning, tired evidently, but cheery and singing.

Civilisation makes Men Soft.—Civilised man in towns does not live a life that fits him for being a soldier. A lot, however, can be done with soldiers if their diet, exercise, clothing, &c., be scientifically taken in hand. Most of us eat too much, drink too much, dress too warmly, and sleep too soft.

I have made the above remarks to enable me to emphasise the opinion I hold that hygiene in the field, and in quarters, too, is of little value if the men are weaklings, and have no idea of discipline in sanitary matters. The soldiers should be equally endowed with valour, discipline and hardihood. Sterilised water alone will not prevent them from breaking down under fatigue, and sanitary laws will not be obeyed in war unless men have had sanitary discipline and sanitary instincts instilled into them in peace. Only a hardy and well-disciplined army can be kept really healthy in war.

The following hints, the results of my own personal experience, are here submitted for what they may be worth.

The March.

How to Save Men on the March. Sleep more Important than Avoiding Sun.—It is not proposed to discuss here lengths and times of marches and halts. These are fully understood, but one point is perhaps not always borne in mind, *i.e.*, that it is useless to march all night to avoid the heat of the day, if refreshing sleep, owing to absence of shade, dust, &c., is unattainable in the daytime. A small party can march all night and find shade and shelter by day where a large force cannot.

Lightening the Soldiers' Load. Overloading the Men.—In war the infantry soldier often carries on his person not only his arms, ammunition and equipment, but food for twenty-four hours or more, and any extra covering he may need at night. It requires training to carry even a load of 20 lbs. for a long day without feeling fatigue. Anything that will take part of their burden off the men's backs will greatly increase their powers of marching, and lessen the chance of their breaking down.

Advantages of Light Push-cart.—With this object a light pushcart is suggested; one for each section of twenty-five men. This cart would take the men's great coats, entrenching tools, and (say) 100 rounds of ammunition each. The man would carry his rifle, bayonet, 50 rounds, haversack, mess tin and water-bottle. (Per-

haps haversack and mess tin might go on the cart.) The cart would be of such a pattern that it could either be pushed by men or drawn by an animal. The men could take turns of pushing it, and in this way could carry their loads with much more comfort than on their backs. The cart would be sufficiently strong to get over any ground where men could, and for this purpose would be provided with drag ropes. The extra ammunition, &c., could be readily and rapidly distributed to the men before going into the fight, and the cart would then be available for bringing up ammunition and taking wounded to the rear. It would also be most useful for all sorts of camp duties, and for sending rations to outposts.

Boots.—The question of boots cannot receive too much attention. They must fit well, and be soft. The sole must be of sufficient thickness to prevent the foot getting bruised, and yet not too thick and heavy, nor too stiff. The soldier will only have one pair of boots with him for days together. They will often be wet, and sooner or later they will wear out; the soles going first. A soldier's boots, therefore, should (1) be easy to dry; (2) easily resoled. It is the inside of the boot under the tread of the foot that takes longest to dry, as it is protected from the heat of a fire by the upper. This difficulty can partly be got over by having removable felt or cork soles which can be taken out and dried.

Desiderata for Soldier's Boot.—It would be worth while offering a reward to the boot trade for the design of a soldier's boot that would satisfy the following requirements:—(1) Comfortable to walk in; (2) it should admit of being readily resoled in the field by an unskilled man, spare soles being carried for each pair of boots; (3) relief capable of being given to rubbed or injured parts of feet, *e.g.*, heel; (4) should open well so as to dry readily before a fire.

Attention to Feet.—The soldier should be instructed in the importance of washing and rubbing his feet whenever possible after a march, and of washing his socks. He should also carry a little powdered borax to dust between his toes or over any part that is rubbed.

An Improvised Footgear.—I noticed in Bulgaria, when passing through in the train, that the peasants had rags tied round their legs and feet, and wore raw hide sandals. It appeared to me that these were made by placing the foot on a hide, running a knife round it, and then boring holes round the edge of the part so cut out, and lacing it over the foot with thongs. I have worn many sorts of footgear in various countries in my desire to find an ideal stalking shoe. Sandals and shoes that are not made of

uppers stitched to a stiff sole are apt to slip from under the feet on sidelong ground.

Boots for Mountain Work.—The best boots I ever wore for mountaineering had *sambur* leather uppers, and the soles made, not of one stout piece of leather, but of several thin pieces stitched together with thongs. They were thus pliable and enabled a grip to be taken of the smoothest rocks, whilst being thick enough to protect the feet from being bruised on any ground. They had no heels.

Footgear for Work on Mountains in Winter.—For hunting ibex and bears in the mountains of Armenia in winter, I wore native shoes with soles made of hemp and rags and worsted uppers. Inside these were several pairs of socks, then a sort of boot of waxed calico, and finally felt was tied round the feet before they were put into the shoes. This arrangement kept the feet warm even whilst waiting about on the mountain-side in the most bitter cold. It was not clumsy.

The soldier has not yet got an ideal boot for war, good as the British soldier's footgear is for peace work. In designing a boot for war, prejudice and preconceived notions as to appearance, &c., must be set aside and the subject approached in the light of common-sense and experience. The town-bred soldier is not as hardy a man as the sportsman, yet he has not the comforts the latter has, either in the quality of his clothes and food, or, as a rule, in the amount of transport provided for him. The little he has, therefore, should be the very best of its kind, and no expense should be spared in matters that would affect his health. A sick soldier in war is not only costly, he is an encumbrance.

Hot Food and Great Coats at End of March.—It is of the greatest importance to give men something hot at the end of a march. Waiting for baggage to arrive and meals to be cooked, whilst the body, soaked with perspiration, chills in the evening air, prepares the way for an attack of fever. Now is the time to put on great coats. They should never be worn on the march, whether it is raining or not. A dry great coat over wet clothes is better than a wet great coat over clothes wet, not with rain, but perspiration. If at the same time half a pint or so of hot strong soup, cocoa, or such like, and a biscuit is forthcoming at once, the men can light their pipes and wait for the evening meal feeling refreshed in body and cheered in spirits. Most important of all is it that the outposts, on whom the security of the force for the night must depend, should be "made men of"

by these simple and obvious means. Personally, I have staved off many an attack of fever by taking nourishment of this sort at the right moment. Lassitude, fatigue and depression, the premonitory symptoms of fever, give way to a feeling of contentment and readiness to take things as they come.

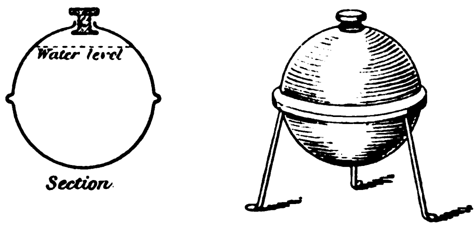
Methods of having Warm Food Ready.—Various methods may be adopted of supplying hot food immediately at the end of the march. (1) Travelling soup cart, or cart with boiling water with which and tablets soup can be made by each man for himself. (2) A "self-cooking" apparatus. There is an article in the market which claims to complete the cooking of food and keep it hot for ten hours. This seems worth a trial. (3) Every man should carry in his mess tin a soup tablet, a few bits of biscuit and matches. He would also, if wise, carry a little kindling. This last method was the one I always adopted. Very little fuel brings the small quantity of water required to a sufficient temperature to make a refreshing cup of soup, and very little time, too, is needed. All three methods are worthy of trial. (1) and (2) would probably require special transport, but the benefit to be gained justifies special effort. (2) would be economical of fuel.

The Kola Nut.—The kola nut in West Africa I found to possess marvellous properties. It banishes hunger, thirst and fatigue. On one occasion I felt an attack of fever coming on about seven in the morning after a wearisome night march. I rested under a tree and chewed a kola nut, and was able to continue work till past 2 p.m., the whole time in the sun, without suffering any inconvenience. It is practically impossible to get the nuts fresh in this country. They require great care to keep them eatable, and it is doubtful whether any of the various preparations from them can compare with the fresh nut.

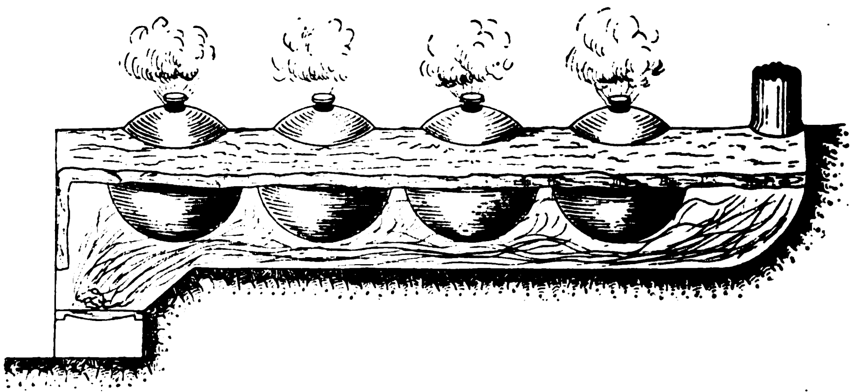
Kit.

Water Steriliser.—To sterilise water by boiling, and to carry it and keep it sterile and ready for issue, the following system is suggested. Boil the water in metal vessels that can be closed by a screw plug. The plug being in the steam whilst the boiling is going on, is sterilised too, and whilst still in the steam it can be screwed home with a key and the vessel removed from the fire. The best shape for this vessel would be spherical—(1) because this shape contains the maximum amount of water for a given amount of metal; (2) because it is strong against external pressure.

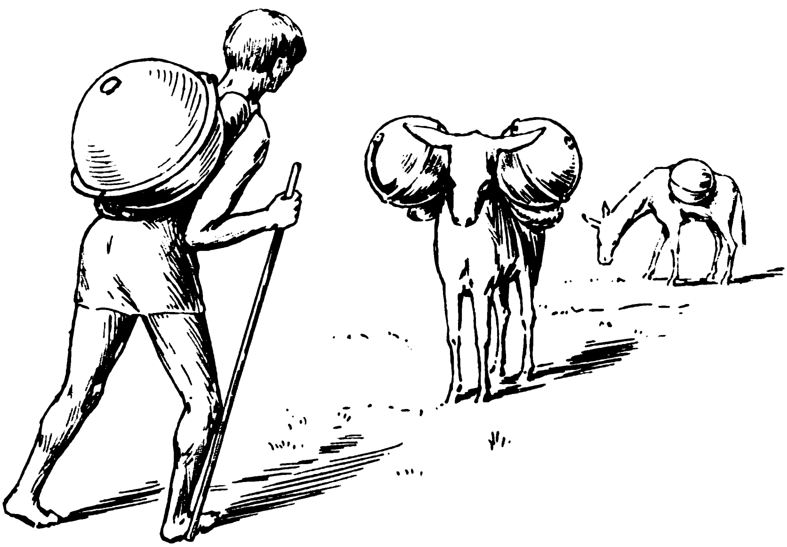
The fact of screwing the plug home whilst the space over the



Water Steriliser.—On tripod for heating singly (plug not screwed home).

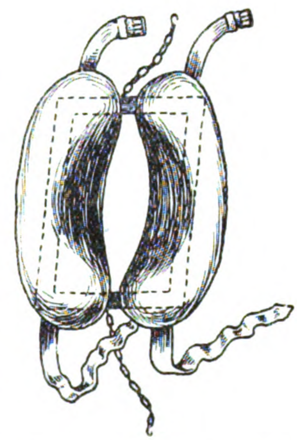


Field furnace at sterilising stations (made of sheet iron covered with sods).



Methods of transporting steriliser.

water in the vessel is full of steam would cause a vacuum to be formed on condensation. It would be possible to make a spherical vessel of one piece of metal, but it would be cheaper and better to make the vessel of two hemispheres flanged and turned on the flanges to fit, and secured together by bolts and nuts, or some other method. The hemispheres could be readily taken apart to clean inside. One of the hemispheres would be prepared so as to take the screw plug at the top. This plug could also be fitted with a tap. If fuel were plentiful, the spherical vessels could be supported on a tripod by their flanges and boiled over an open fire. A better method would be to build a proper boiling apparatus for them at the water-sterilising stations. For transport by pack animals or carriers each sphere would be provided with a basket or frame.



Pad for coolie or pack transport (the steriliser is secured to pad by chains hooked from rim to frame).

Water-bottles. — Water-bottles of the pattern at present in use cannot be thoroughly cleaned or inspected inside. It is useless to issue sterilised water if it is to be put into dirty water-bottles. A pattern of water-bottle has been devised which allows of the whole of the interior being readily cleansed and inspected. It is pressed out of one piece of metal and consequently has no seams to retain dirt. All edges are rounded, which also facilitates cleaning. The lid is sprung into the top. It is provided with a filler fitted with a cork, and thus the lid need only be removed for cleaning and inspection. The bottle is provided with a small spout for drinking.

Boxes. How to keep out Dust.—Boxes for surgical instruments, dressings, &c., to be cleanly and get maximum strength for weight, should be made out of pressed steel with no sharp edges or corners. These should be well rounded. They should close against rubber or leather to make them air and water-tight. Even in spite of this dust will find its way in. All boxes, then, whose contents it is desired to guard from dust should be wrapped in canvas, much as a tradesman wraps a parcel in. The straps would go over the canvas and for pack transport be provided with Ds. This plan was pursued by both British and French sections of the Anglo-French Boundary Commission in North Nigeria to protect theodolites,

watches, &c., from the dust, with which the air was always laden and which got into everything else. Unfortunately, the Congo case was not so treated, and a lot of its contents were damaged by dust. The importance of keeping anything surgical clean is so great that this plan should invariably be adopted. It is wonderful, too, how it protects a box from damp if a pack animal falls when crossing a stream. Some medical panniers sent up to the Boundary Commission arrived in a filthy state, and very little of their contents could be used. I am not aware what the present pattern is, but that one was certainly not good enough. These canvas wrappings are further useful, as they at once afford a clean surface to place articles on when the boxes are open. If made of green canvas white ants will not attack them.

Lighting Hospitals, &c.—For lighting field hospitals and operating tents several systems of light suggest themselves: (1) Wickless lamps that burn paraffin vapour by means of a carburettor; (2) gas machines that make gas out of petrol or petroleum. There are several in the market, and they appear absolutely safe. They give a brilliant steady light which can be distributed by flexible tubing. They require specialising for field service, however, but appear worth a trial. The apparatus is light and simple.

Camp.

Camp Conservancy.—Men and animals should not be marched straight on to a camping ground, otherwise it is almost impossible to prevent the site of the camp and its neighbourhood from being polluted. A halt should be made about ten minutes from the camping ground, and animals encouraged to stale, and men allowed to fall out.

Deep latrine trenches of present pattern involve too much labour. It is preferable to have several short lengths of trench about a foot wide and nine inches deep and three feet long, which the men use with one foot on each side of trench. These should be filled in and prolonged frequently. Where possible, light trestles might be carried to span these trenches. In standing camps, trestles and buckets should be used. These buckets should be of pressed steel, seamless, with rounded edges, and should be frequently emptied. Whether filled with earth or deodorised liquid they should be emptied into a specially designed collecting cart. This cart to be covered and provided with tipping lids, and a derrick that will enable the buckets to be emptied with the minimum of handling and without the possibility of their contents being splashed about or spilt.

THE ARMY BEARER CORPS.

By Major A. E. MILNER.
Royal Army Medical Corps.

In India, all departments and branches of the Army have been exerting themselves during the last few years with untiring energy in the interests of efficiency. There is no administration, corps or regiment which is not undergoing a change for the better; the period cannot fail to be described in the history of this country as one of awakening from a condition of lethargy. When money is to be allotted for military expenditure, the combatant branches of the war machine receive first consideration. Improvements in hospitals and medical efficiency generally are, in consequence, more difficult to achieve than improvements in other branches of the Army. It is therefore satisfactory to know that along with all the reorganisation that has been progressing the medical services in India are keeping pace.

A few years ago, in India, Medical Officers, Assistant Surgeons, and Hospital Assistants, were the only skilled workers attached to a Bearer Company in the field. The bearers (129 in number) were coolies, serving in the Commissariat Department. They had no knowledge of how a wounded man should be raised from the ground and placed in a dhooly, and first aid to wounded they had never heard of. The number of these coolies employed during peace was never sufficient to meet the requirements of field service, the consequence being that when field hospitals were mobilised they were manned with the "unemployed of Indian bazaars" as ambulance bearers. The number of officers and skilled subordinates on the establishment of a Bearer Company was quite inadequate to attend the large number of wounded requiring their assistance. The 129 dhooly bearers in these Bearer Companies, instead of being trained to their duties, were a source of danger to the wounded. This inefficient organisation is now ended, as, through the exertions of Sir Thomas Gallwey, Principal Medical Officer in India, and Lieutenant-Colonel J. Shearer, of the Indian Medical Service (his late Secretary), the bearer company of a field hospital is now provided, from the Army Bearer Corps, with men who are trained in the important duties they will be required to perform on active service.

The Secretary of State authorised the formation of an Army

Bearer Corps in August, 1902; it forms an integral portion of the Military Medical Service. As at present composed there are four divisions, one for each Command. These divisions corresponding to Commands, are subject to the Lieutenant-Generals Commanding and General Officers Commanding Brigades in matters of discipline; their administration and organisation being supervised by the Principal Medical Officer of the Command with a Special Staff Officer, who also assists in mobilisation arrangements. The total strength of the Corps at present is 6,000, organised in 28 full Companies of 200 men each, and four reduced Companies of 100 men each. Each full company consists of the following administrative Staff and Establishment.

One Assistant Surgeon (from the Indian Subordinate Medical Department). One Pay Havildar. One Pay Naik.	Administrative Staff.
Two Sirdars. Six Mates. One hundred and ninety-two Bearers.	Bearer Establishment.

The Pay Havildar and Pay Naik are obtained from the Native Army, being seconded from their regiments.

During peace Companies are distributed to the various Brigades throughout India. When mobilisation is ordered each company will supply the following for the Field Army:

(1) Bearer Establishment of a Field Hospital.	1 Assistant Surgeon. 1 Pay Havildar. 1 Sirdar. 4 Mates. 128 Bearers.

(2) The Bearer Establishment of Corps Units. (This *personnel* will be affiliated to the Field Hospital as far as possible.)

The Company having furnished the above details for the Field Army, the remainder form a nucleus for a new Company, should one be required, in which case another Assistant Surgeon will be appointed; the Pay Naik will be promoted to Pay Havildar, and a new Pay Naik obtained from the Native Army.

There exists in India the caste of native known as "Kahar." In former years there was occupation for a very large number of men of this caste, who carried palkis, dhoolies, and dandies, but owing to railways and the large increase of carriages in native cities, the numbers employed as carriers decreased enormously. The Kahar caste, however, still remains, although the men are employed otherwise than in the trade of their ancestors, and they are in every way suitable for the Army Bearer Corps. Sikhs,

Dogras and other high caste Hindus acknowledge the Kahar to be a man of good caste, and will drink water from his hands. Apart from this important fact relating to caste prejudice, there is only one comfortable way of carrying a dhooly, and that is the natural way in which the Kahar does it. It is not a walk nor is it a run, but a combination of the two, and the smoothest and most suitable mode of progression for a wounded man. The distance these men can carry a dhooly at a good steady pace is extraordinary. The

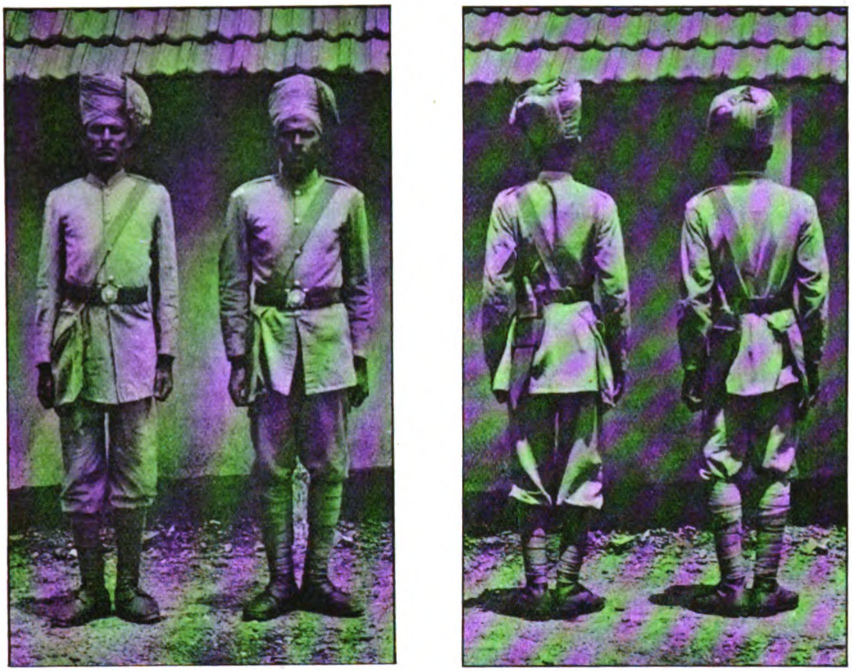


FIG. 1.—Uniform of men of No. 18 Company, A.B.C.

Kahar, then, is the backbone of the Army Bearer Corps, and with careful training very soon acquires a useful knowledge of first aid. He is enlisted between the ages of 18 and 25, with certain necessary qualifications regarding height and chest measurement.

The rate of pay in the Army Bearer Corps is less than in the Native Army.

Pay Havildar	receives	Rupees	10	per mensem + pay of rank and good conduct pay.
,, Naik	,,	,,	5	
Sirdar	,,	,,	9	per mensem.
Mate	,,	,,	8	,,
Bearer	,,	,,	7	,,

In addition the Army Bearer Corps receive pensions at rates applicable to followers, good conduct pay, batta, increase of pay and free rations on service, compensation for dearness of provisions,

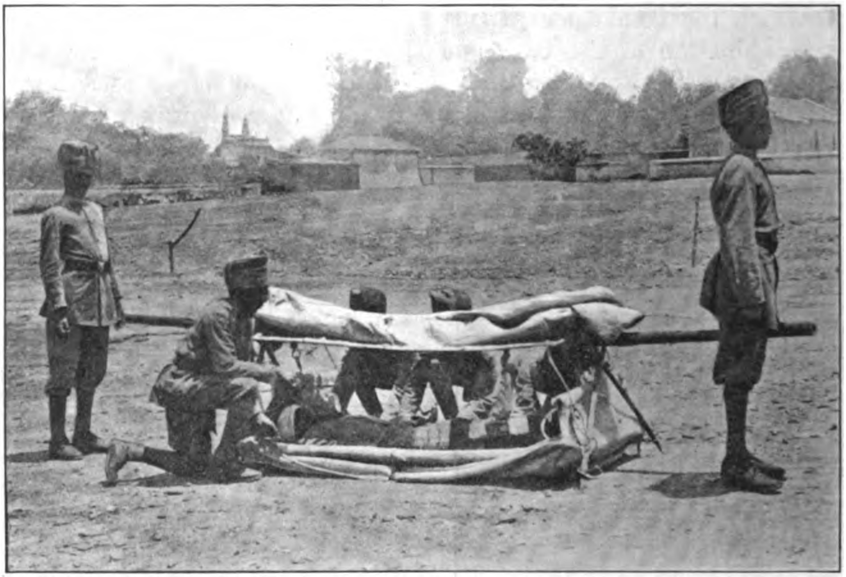


Fig. 2.—First Aid to Wounded by No. 18 Company, A.B.C.

Fig. 3.—Carrying Dhoolies.

quarters in cantonments, tents on line of march, free issue of clothing and half mounting allowance for its upkeep, and some leave.

The uniform of the Corps, as the illustrations show, is much the same as that of the Native Army, the distinctive differences being an Army Bearer Corps badge worn on the shoulders, and a "kukree" in place of a bayonet.

During peace, bearers are trained in the duties which will devolve upon them on active service. Squad drill and dhooly drill are first taught; then stretcher drill, first aid to wounded, conveying sick and wounded, pitching and striking field hospital encampments, and loading and unloading field hospital packages. Every bearer is on parade from one to two hours daily, exercising in the

FIG. 4.—Pitching Tents.

above duties, and, with a view to economy, they are employed in peace on any Government work suitable to their caste, in addition to their ordinary duties, such as water-carrying, work in the Supply and Transport godowns, and as orderlies.

The Army Bearer Corps is in its infancy. There are many ways in which it can be developed so as to be a saving to the State, and I hope, at a later date, to be able to submit to the Journal some of the improvements which may be brought about.

Editorial.

THE FIELD AMBULANCE.

DURING the course of and after the South African War, the organisation of the medical field units of the army was a subject which came in for a great deal of examination, criticism and suggestion. The war passed through so many phases that a very varied experience was obtained of the working of these units under diverse conditions. Thus, up to Magersfontein, Lord Methuen's column had its medical *personnel* and equipment on the full normal scale, and the work was admirably done; later, on the march across to Bloemfontein, and on to Pretoria, military exigencies necessitated a considerable limitation of the scale; and later still, the needs of the many small columns required a reorganisation of the medical arrangements to meet the altered circumstances, and small units, combining the functions of Bearer Companies and Field Hospitals, became the rule.

A committee of officers who had been in command of field units during the war was assembled at its close to discuss their experience and record their opinion as to the advisability of alteration in the then existing organisations. The Report which is published in the "Report of the Medical Arrangements of the South African War" is a very instructive document, and is deserving of careful study. One of the questions on which a very decided opinion is expressed is that the amalgamation of the Bearer Company and Field Hospital into one organisation to combine the functions of both would be most advantageous. Under the separate system there was found to be occasionally a want of harmonious working, there being no co-ordinating authority. Work was unequally distributed and potential was wasted, the Bearer Company being frequently unemployed, whilst the Field Hospital was overworked. The combined system, represented by the Indian Field Hospitals, which were working alongside our own, was free from the above drawbacks, and by so much the more efficient; there was no dual control, and the work was more equally distributed and economically done.

Other points which South African experience emphasised, were the necessity for easy and instant divisability, the need for a much larger proportion of stretchers and stretcher-bearers, and

Field Ambulance in Three Sections, each Accommodating Fifty Cases.

Section A.

Distribution	Lieutenant-Colonel	Captains or Lieuts.	Quartermaster	Warrant Officers	Staff-Sergts. or Sergts.	Bugler	Corporals	Privates	Total	Horses: Riding	Horses: Draught	Horses: Total	Vehicles: Cart, water	Vehicles: Waggons, amb.	Vehicles: Waggons, G. S.	Vehicles: Total
Bearer Division	..	1	..	..	1	1	1	*†39	43	1	..	1	..	..	..	..
Tent Division:—																
Officers	1	1	1	..	..	..	..	..	3	3	..	3	..	..	..	..
Sergeant-Major	..	..	..	1	..	..	..	..	1	1	..	1	..	..	..	..
Non-Commd. Officers	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Stewards	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Compounders	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..
Cooks	..	..	..	..	..	..	1	1	2	..	..	..	..	..	..	..
Packstores	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..
Clerks	..	..	..	..	‡1	..	..	1	2	..	..	..	..	..	..	..
Tent orderlies	..	..	..	..	..	..	..	7	7	..	..	..	..	..	..	..
Washermen	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..
Supernumeraries	..	..	..	..	..	..	..	3	3	..	..	..	..	..	..	..
Total R.A.M.C.	1	2	1	1	3	1	3	52	64	5	..	5	..	..	..	..
A.S.C. attached:—																
Sergeants	..	..	..	..	1	..	..	..	1	1	..	1	..	..	..	..
Drivers for vehicles	..	..	..	..	..	..	..	15	15	..	30	30	1	4	3	8
,, ,, spare horses	..	..	..	..	..	..	..	1	1	..	2	2	..	..	..	..
,, spare (10 per cent.)	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..
Batmen	..	..	..	..	..	..	..	4	4	..	..	..	..	..	..	..
Total A.S.C.	..	..	..	..	1	..	..	21	22	1	32	33	1	4	3	8
Total Field Ambulance	1	2	1	1	4	1	3	73	86	6	32	38	1	4	3	8

Section B.

Distribution	Major	Captains or Lieuts.	Staff-Sergts. or Sergts.	Bugler	Corporals	Privates	Total	Horses: Riding	Horses: Draught	Horses: Total	Vehicles: Cart, water	Vehicles: Waggons, amb.	Vehicles: Waggons, G. S.	Vehicles: Total
Bearer Division	..	1	1	1	1	*†38	42	1	..	1	..	..	..	..
Tent Division:—														
Officers	1	1	..	..	..	..	2	2	..	2	..	..	..	..
Sergeant-Major	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Non-Commd. Officers	..	..	1	..	..	..	1	..	..	..	..	..	..	..
Stewards	..	..	1	..	..	..	1	..	..	..	..	..	..	..
Compounders	..	..	1	..	..	..	1	..	..	..	..	..	..	..
Cooks	..	..	..	..	1	1	2	..	..	..	..	..	..	..
Packstores	..	..	..	..	1	..	1	..	..	..	..	..	..	..
Clerks	..	..	‡1	..	..	1	2	..	..	..	..	..	..	..
Tent orderlies	..	..	..	..	..	7	7	..	..	..	..	..	..	..
Washermen	..	..	..	..	..	1	1	..	..	..	..	..	..	..
Supernumeraries	..	..	..	..	..	4	4	..	..	..	..	..	..	..
Total R.A.M.C.	1	2	5	1	3	52	64	3	..	3	..	..	..	..
A.S.C. attached:—														
Sergeants	..	..	1	..	..	..	1	1	..	1	..	..	..	..
Drivers for vehicles	..	..	..	..	..	13	13	..	26	26	1	3	3	7
,, ,, spare horses	..	..	..	..	..	1	1	..	2	2	..	..	..	..
,, spare (10 per cent.)	..	..	..	..	..	1	1	..	..	..	..	..	..	..
Batmen	..	..	..	..	..	3	3	..	..	..	..	..	..	..
Total A.S.C.	..	..	1	..	..	18	19	1	28	29	1	3	3	7
Total Field Ambulance	1	2	6	1	3	70	83	4	28	32	1	3	3	7

Section C.

Distribution	Major	Captains or Lieuts.	Staff-Sergts. or Sergts.	Bugler	Corporals	Privates	Total	Horses: Riding	Horses: Draught	Horses: Total	Vehicles: Cart, water	Vehicles: Waggons, amb.	Vehicles: Waggons, G. S.	Vehicles: Total
Bearer Division	..	1	1	1	1	*†38	42	1	..	1	..	..	..	..
Tent Division:—														
Officers	1	1	..	..	..	..	2	2	..	2	..	..	..	..
Sergeant-Major	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Non-Commd. Officers	..	..	1	..	..	..	1	..	..	..	..	..	..	..
Stewards	..	..	1	..	..	..	1	..	..	..	..	..	..	..
Compounders	..	..	1	..	..	..	1	..	..	..	..	..	..	..
Cooks	..	..	..	..	1	1	2	..	..	..	..	..	..	..
Packstores	..	..	..	..	1	..	1	..	..	..	..	..	..	..
Clerks	..	..	‡1	..	..	1	2	..	..	..	..	..	..	..
Tent orderlies	..	..	..	..	..	7	7	..	..	..	..	..	..	..
Washermen	..	..	..	..	..	1	1	..	..	..	..	..	..	..
Supernumeraries	..	..	..	..	..	4	4	..	..	..	..	..	..	..
Total R.A.M.C.	1	2	5	1	3	52	64	3	..	3	..	..	..	..
A.S.C. attached:—														
Sergeants	..	..	1	..	..	..	1	1	..	1	..	..	..	..
Drivers for vehicles	..	..	..	..	..	13	13	..	26	26	1	3	3	7
,, ,, spare horses	..	..	..	..	..	1	1	..	2	2	..	..	..	..
,, spare (10 per cent.)	..	..	..	..	..	1	1	..	..	..	..	..	..	..
Batmen	..	..	..	..	..	3	3	..	..	..	..	..	..	..
Total A.S.C.	..	..	1	..	..	18	19	1	28	29	1	3	3	7
Total Field Ambulance	1	2	6	1	3	70	83	4	28	32	1	3	3	7

Remarks

* 1 corporal or private to each ambulance waggon as waggon orderly.

† 6 stretcher squads in each section and 6 bearers in each squad, 5 of whom will be specially enlisted for the purpose on mobilisation.

‡ For clerk and pay duties.

R.A.M.C.

Lieutenant-Colonel	1
Majors	2
Captains and Lieutenants	6
Quartermaster	1
Warrant Officer	1
Staff-Sergeants and Sergeants	13
Buglers	3
Corporals	9
Privates	66
Specially enlisted men	90
Total	192

A.S.C.

Sergeants	3
Privates (including batmen)	57
	60

the advisability of freeing the medical unit from the brigade control and bringing the whole of the medical resources of the division more directly under the sway of the Divisional General Officer Commanding and his Principal Medical Officer. All these *desiderata* are obtained in the "Field Ambulance," which has now superseded Bearer Companies and Field Hospitals, and of which the War Establishment was published with Army Orders of March 1st, 1905.

The Field Ambulance combines the functions of Bearer Company and Field Hospital. It is composed of a "Bearer Division" and a "Tent Division." The former comprises eighteen stretcher squads of six men each, against eight squads of four men each in the Bearer Company; the number of waggons remains the same, but each is fitted to carry four lying-down cases. The "Tent Division" has accommodation for 150 cases. The Ambulance is divided into three sections, which split into a Bearer Sub-division and a Tent Sub-division; each is a small replica of the whole, and being permanently organised is capable of instant detachment. The Field Ambulance has been removed from the Brigade War Establishment, and now belongs to the Divisional Troops, two being allotted to each Division.

The institution of the Field Ambulance marks a fundamental change in our medical arrangements. The unit is the outcome of actual experience in the field, and we have every confidence that it will be found in its practical working more elastic and better adapted to perform the functions required of a mobile medical unit than the two organisations which it has replaced. The subjoined table shows the constitution of the unit and the formations of the sections.

Clinical and other Notes.

REPORT OF A CASE OF COMPOUND FRACTURE OF THE OLECRANON PROCESS WHICH WAS SUTURED WITH KANGAROO TENDON.

By Major F. J. W. PORTER, D.S.O.
Royal Army Medical Corps.

Private C. was admitted to the Military Hospital, Colchester, on November 30th, 1905, suffering from a wound of the right elbow joint, caused by his colliding with a tram car. There was a transverse wound across the back of the joint, and the olecranon was separated from the shaft to the extent of about one and a-quarter inches. The patient was exceedingly dirty, so the wound having been plugged by a swab soaked in 1 in 500 perchloride of mercury, the skin was thoroughly cleansed with turpentine and soap. The joint was then well syringed out with 1 in 1,000 perchloride of mercury, the ulna and olecranon drilled in two places, and the latter approximated to the former by two stout pieces of kangaroo tendon. The apposition was perfect. The fibrous tissues were then sutured with kangaroo tendon, so as to take all strain off the bone sutures. The skin was united by silkworm gut, and a rubber tube placed in the joint. The limb was put in a splint, almost straight. There was a rise of temperature after four days, which caused some alarm, but it proved to be due to an attack of follicular tonsillitis.

Owing to the free use of turpentine, and the presence of jaconette on the splint, the inner side of the arm became eczematous, and the splint had to be removed after five days. The limb was then laid flat on a pillow, slightly flexed. Healing by first intention ensued, and passive motion was commenced at the end of three weeks.

The patient was discharged to sick furlough on January 16th, 1906. He could then flex the forearm to beyond a right angle, and the movements were improving daily.

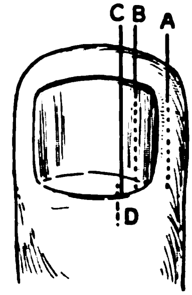
A SIMPLE OPERATION FOR RADICAL CURE OF INGROWING TOE NAIL.

By Major F. J. W. PORTER, D.S.O.
Royal Army Medical Corps.

In the Service this painful affection is very common, and the methods of treatment are various. I have for several years past practised a simple operation taught me by Major C. J. Holmes, R.A.M.C. (R.P.), and with such success that I venture to submit it for publication in the Corps Journal.

It is very necessary to attend carefully to details.

The part is rendered aseptic. A hypodermic syringe is charged with 5 per cent. solution of cocain, and a very sharp, thin needle is pushed into the tissues near the ingrowing portion of the nail as shown at A. A few drops of the solution are then injected. At the end of five minutes (by the watch) the needle is pushed beneath the nail as shown at B, and a few drops more injected. The first application has rendered this apparently most painful procedure almost painless. After another five minutes have elapsed one blade of a sharp pointed pair of scissors is pushed beneath the nail as shown at C, and made to travel right to the end of the nail, but keeping *beneath* the fold of skin at the base. The blades are then closed and the strip is divided. It is then seized with forceps, and twisted out; care must be taken that the prolongation of the nail beyond the fold of skin at D comes away, otherwise the matrix will not be exposed properly at this



point. The part having been swabbed dry a probe covered with cotton wool is then dipped into pure carbolic acid, the surplus removed, and the exposed matrix forcibly rubbed with it, taking care to pass it well below D. A strip of wet gauze is then packed into the groove and a wet dressing applied. The acid is rubbed in similarly on four successive mornings, and the application is not painful. On the fifth day the dead matrix can be removed, and it is never renewed. In consequence of this the nail is never reproduced, and the outermost part presents a flat, instead of a curved edge. I have never known a case which has been properly done relapse, and patients are not kept in hospital longer than seven or eight days. I have tried to do this operation under beta eucain, but it has failed. The reason is that it is not possible to infiltrate the dense tissues with a sufficient amount of the dilute solution which it is necessary to use when working with this substance.

REPORT OF A CASE OF THYROGLOSSAL CYST.

By Major F. J. W. PORTER, D.S.O.
Royal Army Medical Corps.

No. 4968, Boy R., 16th Queen's Lancers, aged 18, noticed a swelling in the middle line of his neck over the notch of the thyroid cartilage, in October, 1904, "about the size of a sixpence." He was serving in South Africa at the time. The swelling was incised, and he states that only blood escaped and that the wound did not heal. The opening was enlarged on board ship, *en route* to England, but no improvement resulted. He was admitted to the Military Hospital, Colchester, on November 18th,

1904, and the sinus was scraped and cauterised two or three times, but without benefit. He came under my care on March 2nd, 1905, and I thought that the case was probably one of thyroglossal cyst. Under an anæsthetic a probe was found to pass upwards from the cricoid cartilage to a point just behind the body of the hyoid bone.

An oval incision was then made, including all the cicatricial tissue which was present, and the whole sinus was dissected out. The wound healed by first intention and there has been no return of the cyst.

The thyroid body is developed from the hypoblastic layer of the embryo by three separate portions, one median and two lateral. The former is developed as a median diverticulum of the pharyngeal hypoblast, opposite the ventral ends of the second visceral arches, the latter as diverticula of the fourth visceral cleft; eventually they all blend in front.

The median diverticulum, which gives rise to thyroglossal cysts, is early cut off from the pharyngeal hypoblast and becomes an island of epithelium, surrounded by mesoblast in most animals. In man, however, it remains for some time as a hollow bifid vesicle, which is connected with the upper surface of the tongue by a small duct or tract of epithelium. Later on this becomes obliterated and disappears; the only evidence remaining in the adult being the foramen cæcum, which is situated in the angle of the V which marks the junction of the anterior and posterior portions of the tongue. It follows from this, that thyroglossal cysts or tumours will be found somewhere in this track, which is intimately connected with the hyoid bone and thyro-hyoid bursa, and is originally connected with the isthmus and lateral lobe of each side.

A NOTE ON THE ADVISABILITY OF ALLOWING WATER IN LARGER QUANTITIES THAN IS AT PRESENT CUSTOMARY TO CASES AFTER OPERATION.

By Major F. J. W. Porter, D.S.O.
Royal Army Medical Corps.

In the *Lancet* for July 8th, 1905, Sir Wm. Bennett advocates the free supply of water to cases of intestinal obstruction, and after abdominal operations. In support of this, he relates three remarkable cases, all of whom he is quite certain would have died had the usual custom of limiting the amount of fluid supplied been adopted. Since reading this article, I have given instructions that my operation cases are to be allowed as much cold water as they wish for, immediately they come round from the anæsthetic. I have kept notes of the last twenty-five cases. They include three cases of removal of appendix, in one of which there was perforation and peritonitis, and several radical cures of hernia in which the omentum had to be ligatured. I find that in ten cases no vomiting took place whatever, and one of these was the appendix case above referred to.

In four cases there was vomiting once, in six cases twice, and in the remainder more frequently. The vomiting has been quite without effort, and there has been an entire absence of that painful dry retching, with perhaps a little acid and irritating fluid which often comes up. There is also none of that trying thirst which one used to see, especially in the abdominal cases, which were limited to a teaspoonful of water. All the nursing staff are quite satisfied that the patients are very much more comfortable under the new system.

The average amount of water drunk during the first twelve hours after the operation has been about two and a half pints. One man drank nearly five pints.

TWO CASES OF VON RECKLINGHAUSEN'S DISEASE.

By Major H. P. JOHNSON.
Royal Army Medical Corps.

Von Recklinghausen's disease, or general neurofibromatosis, has always been considered to be a somewhat rare pathological condition, but the fact of my having discovered two cases in one regiment almost simultaneously would appear to imply that the affection has frequently been overlooked, and that the symptoms have been diagnosed as *Molluscum fibrosum.*

The disease is characterised by: (1) Tumours of the skin of a fibrous character; (2) subcutaneous tumours situated on the superficial nerves, which occasionally grow to a large size and require removal; (3) fibroneuromata of the deep nerve trunks, causing pain and pressure effects; (4) patches of pigmentation of the skin—either freckles or large plaques—of a deep brown colour.

It is rare for all these phenomena to be present at the same time, or even to occur in the same patient; and it will be noticed that neither of my cases presented the third symptom. Von Recklinghausen also considers that the affection is usually accompanied by gradual loss of intellectual power and difficulty in speaking,[1] but both in Rolleston's case[2] and in my two, the patient's mental abilities were not impaired to the slightest extent. It would thus appear that there are two main types of this disease: the first, associated with pain, paralysis and impairment of the mental functions, due to the involvement of the deeper nerve trunks in the neurofibromatosis; the second, and commoner form, presenting no signs of serious disease and shown only by the skin conditions and the presence of small tumours on the subcutaneous nerves.

There are two theories as to the causation of the disease: that of

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[1] "Die multiple Fibrome der Haut, &c.," *Festschrift*, Berlin, 1882.
[2] "A Case of Recklinghausen's Disease," *Lancet*, July 29th, 1899.

Feindel, that it is due to a congenital malformation of the ectoderm;[1] and that of Payne, which is supported by Rolleston, ascribing it to a developmental vice on the part of the mesoblast in the corium and in the nerves.[2] Rolleston sums up the pathology by regarding the disease as depending on a congenital hyperplasia and tumour formation arising in the mesoblast at its junction with the epiblast, and considers that, as in the case recorded by him, progressive changes may take place in the growths, by which a primarily innocent neuroma may degenerate into a sarcoma.

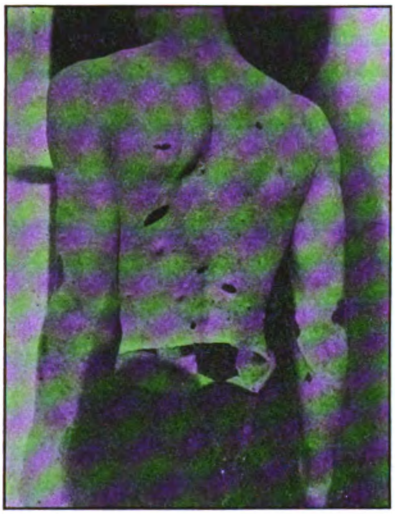

FIG. 1.

An interesting point about my first case is that he was admitted to hospital suffering from *Herpes zoster*. This affection is due to an acute inflammation of, or hæmorrhage into, the posterior root ganglia, followed by secondary degeneration of the ganglion cells. It appears to be possible that this inflammation was caused in the case referred to by the pressure effects on the ganglion of a neurofibroma.

CASE 1.—Rifleman J. H., aged 27, was admitted to hospital on January 16th, 1906, suffering from *H. zoster*, following the course of the lateral cutaneous branch of the eleventh right intercostal nerve. The whole of the chest, abdomen and back are covered with small soft tumours, varying in size from three quarters of an inch to a pin's head; a few also are scattered about his arms and legs. These small growths are

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[1] *Thèse*, Paris, No. 104, 1896.
[2] *Transactions of the Pathological Society of London*, vol. xxxviii., p. 69.

very soft, elastic, and like empty sacs to the touch, resembling lipomata rather than fibromata. I removed one and found that, microscopically, it was a true fibroma with no fat formation whatever. Two years ago a larger growth was removed from the left thigh, which, he informs me, was fatty in character; but I have little doubt that it would have been proved to be a fibroma had it been microscopically examined. Round both elbows there are several patches of brown discoloration, about the size of a shilling, and similar patches occur on the abdomen, back and buttocks. There is no freckling of any part of the body. There appears to be some irregular thickening of both ulnar nerves, and there are many small lumps to be felt under the skin of the trunk, which are probably connected with the superficial nerves. The patient declares that the tumours first appeared when he was in South Africa, in 1900, and is positive that before that date his skin was perfectly clear. A brother of the patient is also stated to have his body covered with small growths, but the date of their appearance is unknown.

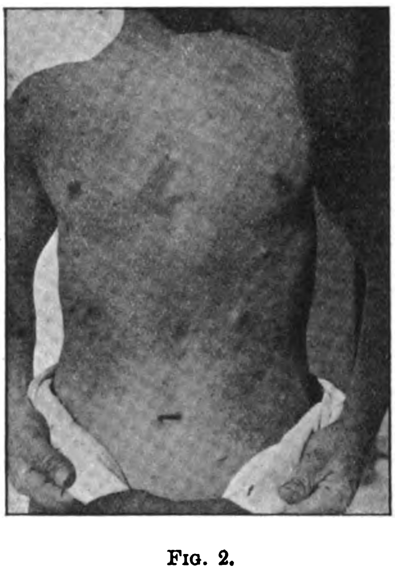

Fig. 2.

Case 2.—Rifleman J. C., aged 26, was admitted to hospital on February 3rd, 1906, suffering from a boil on the cheek. In his case, as will be seen by the photograph, the pigmentation and freckling are much more marked than the tumour formation. I can detect no growths on the deep nerves, and very few on the superficial ones. He is certain that many of the growths have been present all his life, but thinks that they have been getting larger during the past twelve months. He has never

suffered from any attacks of numbness or pain, and except for the local condition, is in robust health. A brother of his has been examined by me, and is quite free from any pigmentation or molluscous growth.

As regards treatment of the affection, Zum Busch considers arsenic by injection, or in Fowler's solution, to be the only useful drug.

I am greatly indebted to Major E. Jennings, I.M.S., and Major G. J. Buchanan, R.A.M.C., for the photographs illustrating the cases.

A CASE OF FRACTURE OF THE BASE OF THE SKULL FOLLOWED BY EPILEPSY, NOT OF THE JACKSONIAN TYPE.

By Captain J. T. CLAPHAM.

Royal Army Medical Corps (H.P.)

Perhaps some points in the following case may be considered of interest. For permission to use the notes I am indebted to the courtesy of Mr. Anthony Bowlby, C.M.G., in whose wards at St. Bartholomew's I saw the case.

On February 17th, 1904, A. B., aged 30, a builder, was brought to the hospital. It was stated that whilst leaning over from a scaffolding to speak to another workman, he lost his balance and fell a distance of twenty-eight feet, attempting to save himself by clutching at a girder in his descent. His past history was good; no fits of any kind; and in his family history there was nothing pointing to epilepsy. On admission he was quite unconscious; there was hæmorrhage from the left ear, mouth, and both nostrils, also from a scalp wound over the right eye. Temperature 96° F. Pulse 52. Respirations 28.

February 18th.—He passed a restless night. There were two attacks of hæmatemesis, fully two pints of blood being brought up. Clots of blood in the pharynx and hæmorrhage into the eyelids and loose connective tissue surrounding them. Temperature 97·8° F. Pulse 60. Respirations 28.

February 19th.—Cerebro-spinal fluid is welling up from the ear and the membrane is seen to be perforated. He is very irritable. Temperature 99·5° F. Pulse 72.

February 20th. — Much quieter. All hæmorrhage has ceased. Temperature was 100° F. in the morning, but fell to 99° F. in the evening. Pulse 48 and 62.

February 21st.—Discharge of cerebro-spinal fluid still profuse; dressings had to be changed twice in the night.

February 22nd.—Quieter and more intelligent. The temperature has come down to normal. (There was no rise henceforth.)

February 24th.—He is now quite intelligent. The aural discharge has practically ceased. As, in spite of three successive ten-grain doses of

calomel and soap enemata, his bowels have not acted satisfactorily for three days, he was ordered seven grains of pulvis elaterini co., which was effectual.

March 2nd.—Frontal headache. Both eyes now open, but there is diplopia.

March 23rd.—No headache. Vision normal.

April 15th.—He is giddy on getting up, and deaf on the injured side.

April 22nd.—Except for giddiness he says he feels quite well. Discharged to convalescent home.

November, 1904.—He had a fit when in the train.

February, 1905.—A fit when in his garden.

July, 1905.—A fit in bed.

November, 1905.—A fit in his kitchen much more prolonged than the others. His wife states that in these fits he fell suddenly and lost consciousness at once. There was no localised convulsion and no aura. In short, the fits appear to have been identical in onset with those of idiopathic epilepsy. Until after the first fit she says that he seemed little the worse for the accident. He did not complain of headache, and was not irritable or depressed; neither was he affected by the sun. He avoided all alcohol, so cannot speak of its effect. He is still deaf on the injured side and has no sense of smell.

In such cases one has to consider whether the accident was the result or cause of epilepsy. In the vast majority of cases the first manifestation of the disease occurs before the age of 20; this man was 30. There was nothing in his family history pointing to the injury having acted as an exciting cause in the presence of an existing epileptic predisposition. Lastly, the manner of his fall, which he tried to break, was not that which is associated with the sudden complete unconsciousness of epilepsy. The very large amount—more than two pints—of blood which escaped, points to laceration of one of the great sinuses, possibly the cavernous, by which the body of the sphenoid is bounded laterally. This is the weakest part of the base of the skull, and the majority of fractures of the middle fossa pass through it. His life was saved by the fact that the fracture extended through the mucous membrane into the pharynx, and thus its compression was obviated. The lesion, by its nature, afforded the free venesection which Mr. Rawling[1] so strongly urges should be adopted at the very beginning of reaction in cases of fracture of the skull. The facial nerve, which, in the majority of middle fossa fractures, is paralysed either temporarily by pressure of blood clot, as was the sixth nerve here, or permanently by division, in this case escaped. But it will be noticed that deafness occurred on the injured side and persisted. Mr. English,[2]

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[1] "Hunterian Lectures on Fractures of the Skull," 1904.

[2] "Jacksonian Prize Essay," 1902.

who found this condition present in nine of the seventy-one cases of recovery which he traced, considers that deafness is more often due to the fracture having involved the middle and internal ear than the auditory nerve itself. Hæmorrhage from the nose and subsequent loss of smell point to the anterior fossa also having been involved by fracture of the cribriform plate of the ethmoid, with injury to the fine filamants of the olfactory lobes.

The great loss of cerebro-spinal fluid due to the very low pressure in the sub-arachnoid space, is noticeable. Cases are recorded where, in a few hours, pillow and mattress have been soaked by the profuse discharge.

The well-known fact that exceptionally large doses of calomel or other purgatives are necessary to obtain any effect after head injuries, is markedly exemplified here.

In the lectures before mentioned Mr. Rawling says that all cases of fractured skull can be divided into three main groups, according to thermometric changes, excluding any alterations secondary to septic, pulmonary or other complications :—

Group I.—The temperature, at first subnormal, undergoes a steady and progressive rise. The prognosis is most unfavourable ; *Group II.*—The temperature, at first subnormal, rises gradually to 101° F. and 102° F., and then for a short time remains steady. This hesitation marks the crisis of the case, a further rise indicating a probable fatal result, whilst a fall offers hopes of a future recovery ; *Group III.*—The temperature, at first subnormal, remains at that level or rises to about normal without any subsequent further elevation. In the former case the patient, owing to the severity of the injury, never recovers from the state of collapse ; whilst in the latter the injury was of so comparatively slight a nature that the stage of shock, being neither prolonged nor deep, was not subsequently followed by the stage of reaction.

He states that these three groups of thermometric changes are so constant that he regards the temperature chart as the surest and almost infallible guide to the prognosis of the case. This case, though the temperature was not actually recorded above 100° F., seems to me to come in the second of these groups, and to bear out his remarks.

As to epilepsy following cranial injury, Sir Wm. Gowers found 108 cases, excluding all doubtful ones, due to trauma out of 3,000. The majority were from depressed or punctured fractures in the motor area. Professor von Bergmann[1] says, that in the German Sanitary Reports for 1870-71, 25 cases of traumatic epilepsy were noted as occurring among 571 cases of shot injuries of the cranial bones, with recovery. This would show only 4·3 per cent. But he states that to these must be added 128 cases affected by epileptiform conditions, such as periodic attacks of

[1] "System of Surgery," vol. i.

dizziness, unconsciousness, &c. Of 167 cases of cranial injury during the American Civil War in men who were previously sound, the pension roll shows 23 epileptics. In Mr. English's 71 cases, 3 were epileptics.

One more particularly associates traumatic epilepsy with convulsions of the Jacksonian or focal type [which start in that part of the body, *e.g.*, the muscles of the thumb, corresponding to the affected centre in the cortex, and gradually extend in a definite order from one group of muscles to adjacent groups. Unilateral at the start, they often spread to the other side and end as general convulsions, at first without, but later accompanied by, loss of consciousness]. This case, however, exemplifies Sir W. Gowers'[1] remark that in some cases general convulsions like those of idiopathic epilepsy follow some more general concussion, which possibly has a widespread influence on nutrition. That cortical lesions, even in the motor area, may give rise to convulsions, exactly like those of idiopathic epilepsy, is considered by Dr. Collier,[2] to be probably dependent upon the rate of discharge and the rapidity with which it spreads. When the discharge is slow and the spread deliberate the typical focal fit occurs. When the discharge is rapid, and the spread so quick that the whole of both cortices are almost simultaneously affected, general convulsions result.

As to the man's mental condition, it will be noticed that, until after the last attack, it was not nearly as much affected as one would have expected after such an injury. Indeed, he felt so well that he neglected to continue the bromide, which was ordered after his first fit, for a month prior to his third attack, and again for two months before his last one. This was unfortunate; for Sir William Gowers says that, as far as we can perceive, medicines act by repressing the discharge, and that it is only after a time that the energy for the discharge ceases to be generated.

Here probably there were adhesion and contraction of the scarred and thickened membranes, with sclerosis of the cortex, on the under surface of the frontal and temporo-sphenoidal lobes; or perhaps a cyst of hæmorrhagic origin. Obviously any operation was out of the question, and the prognosis was bad.

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[1] Clifford Allbutt's "System of Medicine," vol. vii.
[2] Allchin's "System of Medicine."

Travel.

A SIXTY DAYS' SHOOTING TRIP, AND MY FIRST TIGER.

By Major E. McK. WILLIAMS.
Royal Army Medical Corps.

With a view to exploring the ground prior to a large "shoot" I was desirous of engaging in in 1896, sixty days' leave—during October and November, 1895—was spent in a shooting trip in Bijuor territory, north of the Moradabad-Saharunpoor Railway, at the foot of the Siwaliks and the "Doons" leading in and out of them. The time of year was not the best, the jungle at this time being very dense after the rainy season, but having friends who had been promised a visit and who were to help in the "bundobust" decided my going. After laying in a good stock of provisions, and taking with me a couple of ponies and the usual paraphernalia, a start was made about the middle of October from Agra for Nagina, a station on the Moradabad-Saharunpoor line, where my elephants, "shikari," &c., were found. As it would have been impossible to attempt shooting without elephants, I was lucky in securing twelve, two being lent to me by a police officer—who, by the bye, is rather an important person to know on these occasions—four by the Rajah of Rampur, and the remainder from petty rajahs and "bunnias" in the district. They were lent on the condition of their being fed, and as the feeding of these animals is an expensive item in a station, the mahouts (drivers) always wanting to give them sugar-cane, matters were hurried along for a start. My "shikari" also had collected a small herd of fifteen to twenty buffalo (parah) for tying up for "kills." The first important matter, and which had been left rather late, was—as those who have shot in such places know—to obtain "a purwana"—permission of the different forest officials to shoot over their ground. However, having friends in that service, no difficulty was found in this, as well as on account of the jungles being green at this time. During March, April and May the rules about shooting in these reserves are very strict, and rightly so, on account of the chances of the valuable timber they contain (mahogany, &c., &c.) being destroyed by fires, in some cases by negligence in camp. After spending a couple of days at Tudwana, the first march out and fifteen miles from Nagina, where a panther—one of the largest in the bag—and

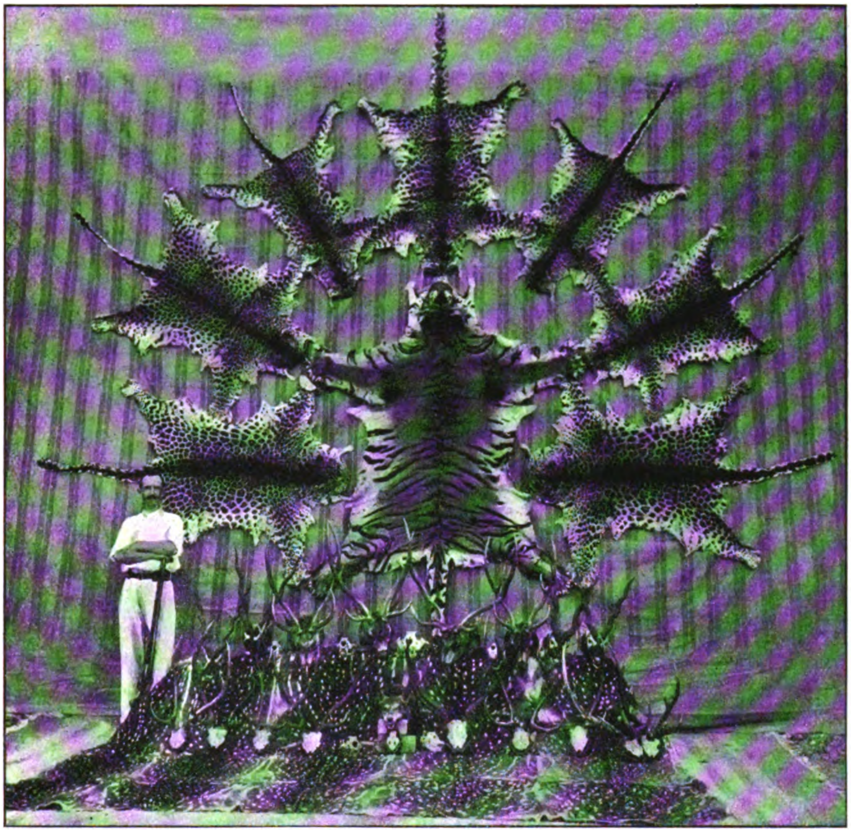
a few black buck were picked up, and having arranged a few necessary details, I left for Parkrao, a camp at the foot of the hills on "the forest line," about ten miles distant. It was determined to make this the headquarters, as "khubber" had been obtained of five tigers who had been doing a great deal of damage amongst the village herds around. However, after a great deal of work, and trying almost every kind of device for three weeks, consisting in driving every likely locality by day, and tying up at night, the brutes were never seen, though they frequently killed. The fact was, they retired by day into inaccessible parts in the hills, and only visited the plains during the night. Four panther and several good cheetal heads were obtained here. News having been brought in of a tiger who was reported to be killing nightly from Morghati, which was twelve miles to the eastward, and at the entrance of one of the big "Doons," it was decided to break camp and try luck in that direction. On arrival I was informed that the brute had been, so far as could be made out, about the place for about a week, and that he "roared" all day and night, a statement at the time not taken very seriously, as a tiger is not, as a rule, a noisy animal. That night, however, I found that what I had been told was quite true, for no sooner had dusk set in than the brute was heard at intervals of scarcely ten minutes on every side of the camp —quite a concert, though not by any means appreciated, and which, more than once, promised to cause a stampede amongst the elephants. He did not kill that night, though we had five "parah" tied in the most enticing situations for him. The next day the same performance was gone through; in fact, at night, to show how cunning he was, he actually walked past three of the buffalo without touching them. We were getting so accustomed to the noise, that something seemed to be wrong on the third night when nothing was heard, and next morning the bamboo cutters reported that on their way down from a place up the "Doon," twenty miles away, they had heard him up in the hills, which shows what distances these animals cover in their nightly wanderings. Great disappointment was felt, but in spite of it, it was decided to remain in the hopes of his return. During this time care was taken to leave the jungles on the side of the "Doon" up which he had disappeared alone, and working more to the eastward, and from six to ten miles from camp, I managed to bag another panther and several more cheetal and hog-deer, and a couple of sambhar. Having spent a fortnight, and all chances of the return of the tiger seeming to be in a very dim future, orders were given for the

return next day to Parkrao, the first camp, as a letter had been received from the Forest Officer reporting that a man-eater, said to be a tiger, had been doing a great deal of harm, frightening away the grass and bamboo cutters, of whom three had been killed within a week; he very kindly offering to place his bungalow at my disposal, and make any arrangements necessary. About 2 a.m., however, of the morning of our departure, I was roused by my "shikari" asking if I had heard the tiger, who had returned, and on listening a deep dull roar was heard coming from a hill about a quarter of a mile away. Turning over, I jocularly remarked, "Kismet hai, Hussain Ali, Kismet hai," and dismissed him with the order to be sure and visit the "baits" early. On his return he reported that one of the "parah" had been killed by the tiger and dragged into the jungle, which he considered a very good place for a drive. Arrangements were at once set on foot for a drive after breakfast, and as soon as the sun had warmed up a bit we started in great hopes of at last being able to have a "look in" at the brute. Seven elephants—the others being left for cutting fodder, &c., in camp—were taken, and on arrival at the place a mile distant I took up my position on the howdah elephant—a magnificent tusker belonging to the Rajah of Rampur—in the centre of the line, with three elephants on each side at intervals of fifteen to twenty paces as the growth was intensely thick. I regretted not having brought all the elephants, but one has to be very careful with the feeding of these beasts, as they soon "go off," and there are always the feelings that "next time" one would not be obliged, to say nothing of the chances of one's brother "shikaris"! After beating through the dense growth very carefully for about a hundred and fifty yards we came on a bit of a clearing, and there he was peering round over his shoulder and about to disappear into the growth on the opposite side. As a more favourable shot could not have been offered, I took as careful aim as was possible under the circumstances, for what with a swaying platform and the noisy "dutt, dutt" of the "mahout"—those who have shot from a howdah will understand—I fired, and had the luck to kill him on the spot. He was a fine brute, measuring from tip of nose to root of tail 7 feet 8 inches, and thence to tip of tail 2 feet 2 inches, between pegs as he lay. On skinning him, the apparent cause of his incessant noisiness was found, consisting of an enormous abscess with over three pints of pus, with a huge jagged lump of lead in it, over his right shoulder and forearm; the liver, spleen and other organs were riddled with others. His skin was in very good condition,

considering his state, and the time of year, and now hangs in the hall of the Officers' Mess at Aldershot, and is seen in the accompanying photograph.

The next day camp was struck, and we proceeded to Parkrao and took in hand operations against the man-eater. On making enquiries I was informed that another woman — who had been cutting grass up in the hills—had been killed about four miles off, but that the villagers had been up in a crowd and brought the body away, which they had burnt. Accordingly, I gave orders that in the event of there being another kill, "khubber" was to be brought in at once, and that no one was to touch the body, as I had made up my mind from what I heard the only way to kill the brute would probably be by sitting over his "kill." Possibly he had killed so frequently owing to his "kills" having been brought away instead of having been allowed to feed on them! About three days later a fifth kill was reported, and practically the circumstances were the same, the victim a woman and cutting grass in the hills about seven miles away. Taking my "shikari" I at once mounted a pad elephant, the only one available at the moment, and went off to the village at the foot of the hills where the "kill" had been. On arrival we were informed that the woman had been killed that morning whilst cutting grass and bamboo. As it was then six o'clock in the evening it was decided that nothing could be done that day. Early next morning, having collected sixty to seventy villagers, a start was made for the scene. The path, and scarcely that in parts, led through dense bamboo brakes and thorny undergrowth, over boulder-strewn and broken ground, in parts very steep, getting thicker and thicker as we neared the "scene of tragedy." It was with the greatest difficulty the coolies were made to show the way, as "going in front" was not at all appreciated, and the post more and more shrunk from as we got closer. Having reached the place where she had been last seen, a few spots of blood and a half-tied bundle of grass were found; a little further on, her sickle and a little more blood, and the rope used for tying the result of the day's labour, but yet no body. On looking over a projecting ledge into the bed of a small, dried up, grass-covered stream, the body was found. It was a revolting sight, the head bitten off, while the flesh had been eaten away from the side of the chest and back, and at that hour in the morning I confess it upset me. The brute had been reported as a tiger, but on seeing the body I at once said to my "shikari" that the state of the body looked more like the work of a panther. Tigers, after killing, usually proceed

to feed from the hindquarters. He was inclined to agree, but was led away by the certainty of the other natives. Preparations were made to build a "machan" in a handy tree overhanging the kill, and as wood was found in abundance this did not take more than half an hour. As soon as finished, and having given orders to the men to return at the first shot they heard, I climbed up into it



and made myself comfortable. Position had scarcely been taken up for more than half an hour when up turned a fine panther, and sitting himself on a large boulder about thirty yards off, began to stretch himself and look round. I felt certain that this was the man-eater, otherwise the noise made in building the "machan" and cutting down branches would have probably frightened him out

of the nullah. The fact was, the cunning brute had come to see if his "kill" had been taken away as the others had been! However, as there seemed so much certainty of his being a tiger on the part of those who said they had seen him, I determined to "play him." In about ten minutes he got up, after again stretching himself, and slowly paced down past my left in the direction the coolies had gone: again showing his cunning, seeing his "kill" still there; this time he went off to see if the others had gone! After about a quarter of an hour a stealthy step was heard on the left, but not daring to look round for fear of making a noise, I was rewarded by seeing him return and again take up position on the same boulder. Even now I did not fire, but after ten minutes or so, on his approaching the "kill," and when within a couple of feet of it—thus proving without doubt that he was the culprit—I fired, and being such an easy shot, of course bagged him. His skin was in beautiful condition, so probably he had not been addicted to such practices very long. Panthers, when they take to man-killing, are much more cunning and bolder than tigers—they have been known to break into huts in a village and bring out their prey! The skin of this panther is the one immediately above the tiger's head. The natives, of course, at first swore that it was not the panther that killed the woman; however, they were convinced when we removed her tongue, part of an ear with a brass earring piercing it, and a large quantity of black skin from his stomach, and, moreover, there were no more "kills" from that date.

Having accounted for the tiger and seven skins and heads seen in the photograph, this narrative is brought to a conclusion in the hope that it may be of interest to my brother officers.

Reprints, &c.

THE ADVISORY COMMITTEE FOR PLAGUE INVESTIGATION IN INDIA.

FIRST PROGRESS REPORT TO THE COMMITTEE (JULY 7TH, 1905).[1]

By Dr. C. J. MARTIN, F.R.S.

Although a sojourn of three months in India is an inadequate time to come to final conclusions, I think it advisable to state my conception of the nature of the problems confronting the Committee. Before, however, proceeding to the consideration of the work which, subject to the approval of my colleagues, I would suggest should occupy the attention of the Commission in the first instance, it may be as well to briefly state the main conclusions regarding the epidemiology of plague which I have arrived at. The material for the conclusions is necessarily derived in small part only from my own observations of plague epidemics in Bombay and the towns and villages of the Punjab which I have visited, and is largely drawn from the numerous reports upon outbreaks in various parts of India, Sydney, Hong Kong, Alexandria, the Cape Colony, Natal, Lima and elsewhere, and the evidence collected and opinions arrived at by the various Commissions sent out from Europe to study plague in India. I have also had the great advantage of discussing the subject from every point of view with a number of gentlemen who have had extensive experience of plague outbreaks in different parts of India.

(1) Leaving aside the pneumonic form of the disease, which is uncommon (2·5 per cent.), bubonic plague is not particularly infectious or contagious, and experience points to the conclusion that man to man infection plays no important part in the spread of epidemics in India. The disease may, however, be introduced to a new locality and so ultimately occasion a new outbreak, by the agency of man, and for this to occur it is not necessary that the individual himself should be a sufferer from the disease. The evidence for these two conclusions, which may seem at first sight to be in apparent contradiction, is very strong.

(2) Definite localities, huts, rooms, or houses in which plague has occurred amongst rats and men are, during an epidemic, highly infectious. Individuals living and sleeping in such places are liable to contract the disease, whereas a similar close attendance on, or cohabitation with, a plague case in hospital or after removal to a temporary camp is seldom

[1] Reprinted by permission of the India Office.

dangerous. The infection clings to these localities even after they have been evacuated, so that individuals returning to them after one month, in some cases as long as forty-eight days after evacuation, have promptly contracted the disease.

(3) Plague can exist and spread under a great range of climatic conditions, but when once it has become endemic in any particular spot, it exhibits a marked seasonal prevalence. This seasonal prevalence is indeed one of the most striking features of the epidemics. Bombay, for instance, is never free from plague, but the incidence is relatively small from June to December inclusive. In January and February the number of cases rises, at first slowly, then rapidly, and reaches a maximum in March and April, to fall again rapidly in the latter half of April and May. During the former months the number of cases per mensem varies from 50 to 500, whereas during the height of the epidemics the monthly number of cases recorded varies in different years between 4,000 and 7,000. In other parts of India the yearly outbreak shows a particular prevalence during certain months, and plague disappears entirely, or almost entirely, during the greater part of the year. These months of prevalence, however, do not always coincide with those during which plague prevails at Bombay (*e.g.*, Poona and Southern Mahratta Country).

(4) In the great majority of instances the epidemic outbreak of the disease in man is known to have been associated with, and generally to have been preceded by, an epizootic amongst rats. This relationship has been clearly shown by Ashburton-Thompson for the Sydney outbreaks, and again by Blackmore for the epidemic at Port Elizabeth. The observations of Clarke and Hunter, in Hong Kong, show that the epizootic and epidemic possess a similar seasonal prevalence. Further, Hunter is satisfied from his observations that the epizootic appears one or two weeks in advance of the epidemic. This may be the case, but I do not consider that his observations can be taken as *proving* anything more than a general coincidence.

(5) Whether or not plague be primarily a rat disease, and human epidemics merely the participation of man in the epizootic, a view strongly held by Koch and Ashburton-Thompson, the intimate relationship of the two is undoubted, and there are the strongest reasons for regarding the epizootic among rats as by far the most important cause of the epidemic spread of the disease. In this connection I would point out that the common Indian rat (*Mus rattus*) is entirely different in habits to the sewer rat (*Mus decumanus*). The former is a much more domesticated animal, and of climbing habits; it lives mostly in the roofs of huts, and in the Indian villages its relation to man is not unlike that of the cat with us. On account of this intimate relationship an epizootic of plague among this variety possesses greater significance than in the case of *Mus decumanus*. Assuming the substantial accuracy of the above propositions regarding the epidemiology of plague in India, it follows that

in the majority of instances, diseased rats are indirectly responsible for the conveyance of *Bacillus pestis* into the human body, and a knowledge of the epizootic and of the precise means by which this transport occurs becomes of first importance.

Three possibilities suggest themselves.

(1) Rats may soil human food with infected excreta, leading to subsequent infection of man through the alimentary canal. The importance of this form of infection is maintained by Wilm, Hunter, and Simpson. The results of their experiments on alimentary infection of domestic animals do not coincide with those of any other investigators, and the opinion I have derived from clinicians and pathologists in India is that the frequency with which symptoms or *post-mortem* appearances in any way suggest a primary alimentary infection is inconsiderable.

(2) Rats may contaminate the soil or floors of huts with infected excreta. As the people of India live on the floor and eat from the floor, infected dust or soil may find access through the broken or unbroken skin, or be taken into the mouth. Should it be found that *B. pestis* is capable of leading a saprophytic existence under such circumstances, this means of infection would assume greater importance.

(3) Some insect which infests the rats, and which will on occasion feed upon man, may convey the bacillus from the one to the other, or deposit the bacillus in its fæces on the skin to be subsequently rubbed in.

Problems to be Attacked.

(*a*) *Epidemiological Investigations.*—I would suggest that, in the first instance, the Commission should study from as many points of view as possible the epizootic among rats, including the seasonal prevalence of rat plague both in Bombay and in some country villages, and the relation of the epizootic to the human epidemic; and that an attempt should be made to learn as much as possible of the habits of the different species of these animals, including their breeding season, the parasites which infest them, and the existence of subacute or chronic plague among them during that part of the year when the epidemic is absent. To this end the Medical Officer of Health of Bombay was approached, and he has been good enough to co-operate with the Committee in an extensive rat-catching and collecting scheme which is to continue for at least one year. At the same time the Commission has organised arrangements for the thorough examination of 500 to 1,000 rats per day, and the detection of those plague infected. The principal breeding season of these animals will also be determined by the proportion of those found pregnant. The relation of the breeding season to the epizootic can thus be studied. The existence and extent of the epizootic will in this way be determined throughout the year. At the same time it is hoped that, with the co-operation of the Medical Officer of Health of Bombay, a particular and

detailed enquiry will be able to be made into the circumstances attending each case of plague, at any rate during the rise of the epidemic.

(*b*) *Experimental Work.*—I would suggest that the problems which should engage the attention of the Commission be:—

(I.) The methods of the exit of *B. pestis* from the bodies of man and rats, and, as far as possible, the quantitative importance of each.

(II.) The condition under which *B. pestis* is capable of leading a saprophytic existence, paying particular attention to: (1) Experiments conducted upon a large scale, and under conditions as natural as possible; (2) variations of virulence under above circumstances.

(III.) The variations in virulence by continued passage through rats without intermediate culture: (1) By subcutaneous inoculation; (2) by cutaneous inoculation (rubbing on skin); (3) by feeding on carcase of rat previously dead of plague.

(IV.) The complete investigation of the fleas and other parasites infesting rats in India as to: (1) Physiological anatomy; (2) life history and habits; (3) fate of *B. pestis* (septicæmic blood) in alimentary canal of same (after sucking); (4) passage of *B. pestis* in fæces of fleas and other parasites; (5) effect of sojourn in alimentary canal of insects on virulence of *B. pestis*.

(V.) Experiments on the infection of animals by means of fleas, &c., fed upon animals infected with plague: (1) Direct experiments with individual specimens of fleas, *i.e.*, experiments in which captured fleas are allowed to feed upon septicæmic rats, and subsequently at varying intervals upon healthy animals (rats, guinea-pigs, monkeys, rabbits); (2) experiments to determine at what stage after feeding on blood containing *B. pestis*, fleas, &c., may become capable of conveying infection; (3) experiments with animals, some infected (10), some clean (50), in godowns (miniature huts erected in the compound at Parel, and exactly imitating the natural conditions), some of which are kept artificially supplied with rat fleas, whereas in others, as controls, similar numbers of infected and clean animals are kept, but without fleas.

(VI.) The possibility of infecting common domestic animals, either by inoculation or feeding. This is necessary in view of the recent support given by the experiments of Simpson and Hunter to the contention of Wilms, that pigs and some other domestic animals and birds can be infected with plague by feeding. As mentioned above, their conclusions are not in accord with those of numerous other observers who have made similar experiments.

In addition to the problems mentioned above, the facts concerning seasonal prevalence of the disease in various parts of India are being collected and analysed. This is important, as any explanation of the natural spread of plague during an epidemic will have to be tested to see how far it is capable of interpreting the particular prevalence of the disease during certain months of the year in any one locality.

The Commission is concentrating its attention more particularly upon epidemiological investigations and the problems under headings IV. and V. It is also endeavouring to ascertain, not only the means by which the *B. pestis* leaves the body of rats and men sick of the disease, but also, so far as possible, the quantitative importance of each mode of exit.

Organisation and Agency for the Collection and Examination of Bombay Rats for Plague.

Supply.—The Municipal Corporation of Bombay, co-operating with the Commission, arrange to send to the Parel Laboratory each day all the rats caught by their rat catchers or found dead by their staff of sweepers. On arrival at the laboratory the rats are examined on the following scheme, which is so arranged that the rats pass in series through the hands of a series of unskilled native assistants, each of whom, however, has been trained in his particular item of work and is competent to perform it. The procedure differs slightly in the case of dead and live rats. For dead rats the series is: *Izal-wallah,* who dips the dead rat in a solution of Izal (which diminishes the nuisance from flies in the subsequent operations, and washes the rats, many of which are very filthy) and hands it to *Card-wallah,* who attaches the card, with which each rat is provided, to a leg.

Date Number
Catcher
Locality
Where and how caught
Weight Number of fleas
Species
Sex Pregnant
Infected
Initials.

The card remains on the rat throughout the series of operations. At this stage the rat, still accompanied by the man who has brought it to the Laboratory, is shown to the *Clerk,* who enters on the card the following particulars:—Date, Serial Number of rat, Name of Catcher, Alive or Dead, How and where caught. The clerk hands the rat to the *Weigh-wallah,* who weighs the rat on a spring balance. The weight is entered on the card by the *Clerk to Weigh-wallah,* from whom it is taken by an attendant to the *Board-wallah,* who pins the rat on a board ready to be dissected.

The rats pinned out are laid in rows on a series of long tables. Each table has in attendance a *Cutter Up,* who opens the rat by an incision,

which includes the groin, neck and axilla on both sides, so as to expose the glands in these regions, and *Clerk*, who enters on the card the following particulars, which are determined by both in consultation: Sex, pregnant or not, and species, presence of buboes; and who hands to the *Cutter Up* a slide ready to receive a smear from the spleen (or bubo, if any are found). As the smears are made they are collected by an attendant and taken to the *Stain-wallah*, who stains the smears in carbol-thionine blue. The rats are now removed to a series of numbered shelves, where they remain until the microscopical examination of the smears has been made. This is done to enable further examination, cultures, and inoculation experiments to be made in the cases in which organisms microscopically indistinguishable from plague are discovered.

For live rats the procedure is slightly different. The series is: Chloroforming, search for fleas, *card-wallah*, after which the series is the same.

Chloroform.—Cages are put in a tin-lined case containing chloroform vapour.

Flea-wallah receives the rats from the cages, and by searching and dumping on a sheet of white paper, removes the fleas, the number of which is entered on the card by a clerk. The fleas are subsequently examined by an expert and their species determined. At this stage the series for dead rats is entered.

Staining.—The fixing and staining is arranged so that each slide, numbered with the serial number of the rat, passes successively through—(1) Absolute alcohol, (2) carbol-thionine blue, (3) water.

Microscopical Examination.—This is carried out in two stages. Three or four unskilled microscopists, who have been trained to use an immersion lens and to recognise a plague bacillus, examine the specimens and put on one side any that contain bi-polar staining organisms, or organisms that resemble in any way the plague bacillus. These slides are subsequently examined by the member of the Commission in charge, and the corresponding rat having been kept, a detailed *post-mortem* is made, cultures are taken, and the spleen is directly inoculated into guinea-pigs by rubbing on the shaved skin.

Note.—This method was followed for about two months. It then appeared that the inoculation of a guinea-pig with material from every case of apparent plague in the rats, was rapidly consuming the stock of available guinea-pigs. Examination of the records showed, too, that in every case (with one exception) where the provisional diagnosis of plague had been definitely made on the *post-mortem* examination, and examination of smears from the blood and organs, the inoculation of guinea-pigs gave identical results. The members of the Commission had also by this time had the advantage of examining some 15,000 rats, and the experience thus gained made for still further accuracy. In future, therefore, cases in which typical naked-eye signs of plague were combined with the

presence of bacilli of typical appearance and distribution in the organs, animal inoculations were omitted. Inoculations into guinea-pigs were reserved for instances in which the appearances and results of microscopical examination were not perfectly typical of plague infection.

Agency Employed.—This scheme is so arranged that each operation is performed by a different man. This admits of each man (at first an entirely unskilled native) being trained to perform his particular operation with skill. The native is a quick learner, and, although entirely ignorant of the object of his operation, can be trained to do it with precision. At present the Commission is occupied in getting their scheme into working order, but in the course of a few weeks it is hoped that it will no longer be necessary for them to take any very active part in the preliminary routine, one member being present each day to supervise the operations. A scheme such as this has the advantage that merely by adding to the number of the operators any quantity of rats can be examined. At present some 400 per day are received, but the Health Authorities inform us that this number will be largely increased when their organisation is in better working order, and if, as is probable, the epizootic rages during the epidemic, the number of dead rats will be greatly increased during the plague season. It will be noted that by a process of exclusion only those rats which are suspicious arrive at the final stage of examination by the Commission, but that even in this process of exclusion one member of the Commission is in charge.

SECOND PROGRESS REPORT TO THE COMMITTEE (NOVEMBER 10TH, 1905).

Since my previous report the Commission has made considerable progress. At the time of that report the Commission consisted of Captain Liston, Drs. Petrie and Rowland and myself, together with Hospital Assistant Avari, who was lent by the Bombay Government.

(1) Since then I have to report considerable increase of staff, viz., Captain Lamb, I.M.S.; Captain Gloster, I.M.S.; Civil Assistant Surgeon Kasava Poi; Mr. Vinayak Manker, L.R.C.P., M.R.C.S., D.P.H.(Camb.); Hospital Assistant Ramchandriar; Mr. Dryaneshwar Turkhud, M.B., C.M.(Edin.). Mr. Turkhud is not strictly a member of the Commission, as he is employed by the Municipality, and was instructed to co-operate with the Commission through the kindness of Dr. Turner, Medical Officer of Health. As I explained in my previous report, much of the epidemiological enquiries which are being pursued by the Commission in Bombay would be impossible without the active help of the Health Department. It is really a co-operative undertaking, in which the existing machinery of the Health Department of the Municipality is being employed. This machinery is under the direct control of the Medical Officer of Health, who has shown the utmost courtesy to the members of the Commission

and readiness to assist its efforts by giving instructions to his subordinates to act in accordance with their wishes.

(2) *Examination of Rats in Bombay.*—The systematic examination of rats in Bombay continues satisfactorily; the arrangements for the examination continue on the lines laid down in my previous report; up to the present upwards of 25,000 rats have been bacteriologically examined; at first about 5 per cent. were plague infected, but lately the number has shown a rise to a little over 1 per cent. Plague has rarely been found among those rats caught alive. The analysis of the figures showing the number of pregnant females does not so far indicate any particular breeding season for Bombay, such as has been observed by Gottschlich to be the case in Alexandria. So far, each week about 25 per cent. of the adult females have been found to be pregnant. The fleas caught upon the rats in Bombay up to the present time belong almost entirely to the species *Pulex cheopis* (Rothschild); less than 1 per cent. of fleas discovered belong to other species. It is expected that the number of dead rats discovered by the sweepers and forwarded to the laboratory will greatly increase as soon as the plague season commences. The present organisation can, however, be extended so as to deal satisfactorily with two or three times the present number, when necessary.

(3) *Increase in Scope of Rat Enquiry.*—As mentioned in my previous report, the rats are collected by the Municipality and delivered every morning to the laboratory at Parel. The Commission supplies a daily return to the Medical Officer of Health of all infected rats and the locality whence they came, and is in turn supplied with a similar daily return of plague cases. The relation of these two returns naturally became of interest to the Commission, and was plotted daily upon a large scale map of the city. In many cases there was a striking want of coincidence between the return of plague rats and plague cases, which led to the investigation of the localities concerned, in order to see whether the returns in one or other case might be at fault. In some cases it was found that, for various reasons, no samples of rats had been collected from the particular locality which furnished cases of plague; in others, that the deaths returned as plague appeared on further inquiry to be probably due to relapsing fever or some other acute disease, and in a balance of cases no relationship between infected rats and plague cases was discoverable. In this respect, I must mention that in Bombay the returns of causation of death are seldom certified to by a medical man, but usually represent the judgment of the District Registrar, after conversation with the friends of the patient. To obviate some of the difficulties due to imperfect sampling of the rats of the city, and to ensure a greater measure of accuracy in the diagnosis and return of plague cases, the advisability of having a special officer appointed was suggested to the Medical Officer of Health. Dr. Turner concurred in this view, and, at the suggestion of the Commission, Dr. Turkhud was instructed by the

Health Department of the Municipality to co-operate with the Commission, to supervise the registrars, to make further inquiries into each case returned as plague, and to investigate in detail those localities where plague rats had been discovered. Dr. Turkhud has been engaged in this work during September and October. The Commission has been feeling its way gradually, adding to its subordinate staff as the opportunity of acquiring a good man occurred, and gradually increasing the scope of its inquiries. It has been necessary to proceed quietly owing to the fact that in a co-operative undertaking of this kind, it was advisable to ascertain what was possible to be done before making the attempt. By using the existing machinery of District Registrars, the Commission should be able to collect information concerning every single case of plague occurring in Bombay from now until the rise of the epidemic, when the number of cases may be too great to be coped with. The Commission has every hope, however, that it may be able to satisfactorily collect the necessary information throughout the next epidemic. With this end in view, the District Registrars are being trained by Dr. Turkhud and members of the Commission, and are required by the Municipality to fill in on one or both of the cards below as much information as is possible concerning every death returned by them as plague. The remaining items on the cards are filled in by Dr. Turkhud or some other member of the Commission. These registrars will be continually superintended by members of the Commission, who will themselves be able to visit the houses whence plague cases are derived. The information to be filled in on the cards is designed, in the first place, with a view to determining the relation of rats to the spread of plague, but many other interesting facts will emerge when the time comes for the analysis of the data.

RESIDENCE.

Serial No. See also No.	District and Reporter's Name	Date

Name	Age	Sex	Caste	Employment	Residence	Duration of residence

Date when left work	Date of attack	Date of death	Date of disinfection	Case examined	Case not seen
				Buboes. Symptoms. Diagnosis.	

Description of room	Possible sources of infection
Position. Ventilation. Light. Size. No. of inhabitants. Floor. Ceiling. Tiles. Proximity to gully.	Evidence of occurrence of rats. ? dead rats observed. When? ? previous case in same room or building. When? Evidence of importation of infected articles. Case imported from another locality?

Description of block	Contacts
Number of houses in. ,, storeys in. ,, inhabitants. ,, shops on ground floor. Condition of adjoining gully. Proximity to buildings harbouring rats.	Cases amongst contacts in house or building. ,, ,, attendants. ,, ,, contacts at employment. Migration of contacts. New address.

When and where the nearest plague-infected rat was found. (To be filled in later from Parel records.)

Further history of case. If admitted to hospital, to which, and date. Hospital No.

Employment.

Serial No. See also No.	District and Reporter's Name	Date of visit

Name of case	Address of place of employment	Actual work done by case. Date when left work	Kind of employment carried on
			No. of workmen

	Description of building
Evidence as to occurrence of rats (*e.g.*, dung, capture by disinfecting staff, burrows, nests, &c.). Occurrence of fleas. Proximity of building to grain godowns, stables, or other likely places to shelter rats. When and where nearest plague-infected rat found.	Number of storeys. Floor. Ceiling. Tiles. Light. Ventilation. Proximity to gully. Condition of adjoining gully.

Cases of Illness or Plague amongst Workmen.

Further Remarks.

(4) *Observations on a Punjab Village.*—The city of Bombay is not an ideal place for an epidemiological enquiry. The population is large and varied and scattered over a wide area, there is incessant communication

with other places and extensive migration of the people. It was therefore regarded by the Commission to be most desirable to choose a village of 2,000 to 3,000 inhabitants in which plague had periodically recurred, and endeavour to make of such a complete epidemiological study, including a systematic daily investigation of the epizootic in rats throughout the whole year, as is being done for Bombay. Whilst the Commission was discussing taking the necessary steps to arrange for observations upon some village of the Deccan as convenient as possible to their head-quarters at Bombay, they heard that an investigation on the proposed lines dealing with one of the villages in the Punjab would be welcomed by the Sanitary and Plague Authorities of that Province, and that the Commission could rely upon their cordial co-operation. This project also received the support of the Sanitary Commissioner with the Government of India and of the Lieutenant-Governor of the Punjab. Arrangements have accordingly been made to undertake the study of rat plague and human plague in the villages of Kasel and Dhand in the Amritzar district, in which plague appears to have broken out each year without fresh importation. These are typical congested mud-built Punjab villages of about 2,000 and 3,000 inhabitants respectively. They have little communication with the outside world, so that there will be no difficulty in following the movements of the villagers and any visitors. For the purpose of the investigation a trained officer of the Indian Medical Service, accompanied by a small staff, will be located within half a mile of these villages for at least one year. For the purposes of this investigation the Punjab Government have undertaken to supply:—

(*a*) The services of Captain Gloster, I.M.S., for one year (including travelling allowance); (*b*) a hospital assistant or clerk; (*c*) a staff of sweepers and rat-catchers; (*d*) accommodation for Captain Gloster and assistant, *e.g.*, camp, if bungalow not available: (*e*) to arrange for the making of a map of the villages selected, including every habitation; (*f*) to have a census of the inhabitants taken giving those residing in each house.

On the other hand, Captain Gloster and his assistant will be supplied with all necessary scientific equipment by the Committee.

(5) *Seasonal Prevalence.*—As pointed out in my previous report, this is one of the most striking epidemiological features of plague. Much of the evidence yearly collected by medical officers in all the provinces whose special duty is plague work, indicates that the source of infection remains in numerous villages after the epidemic has died away, and bursts forth again the ensuing season. It is now certain that the disease is kept going in a quiet way amongst rats in Bombay, and how far this holds for other localities will emerge during the course of the present enquiry. Why, at a particular season of the year, the disease shall assume epidemic proportions amongst men, and presumably from the analogy with facts observed in Sydney, Hong Kong, Calcutta, and else-

where, also amongst rats, remains unexplained. Some of the plague returns from various parts of India since 1896 have been analysed, and they show :—

(*a*) That once plague has become thoroughly endemic in a town or district, it appears at a particular season, reaches a maximum, and declines with surprising regularity ; (*b*) that this season differs very considerably in different parts of India ; (*c*) that the first epidemics following the introduction of the disease often happened at seasons other than the time at which the annual outbreak afterwards occurred.

Observations bearing on seasonal prevalence will be continuously collected for correlation with the results of other lines of enquiry, as they come to hand. The facts of seasonal prevalence, as they stand, do not appear to admit of any simple interpretation, such as the direct influence of climatic conditions upon the *B. pestis*, or upon the habits of the people.

(6) *Laboratory and Experimental Work.*—The arrangements connected with the epidemiological work mentioned above have occupied a good deal of the time of all members of the Commission, but several of the laboratory problems suggested in my previous report have been attacked :—

(*a*) Concerning the methods of exit of *B. pestis* from the body of man, experiments were undertaken by Captain Liston and Dr. Petrie during the latter half of May and June, on the quantitative determination of *B. pestis* in the blood of patients at different stages of the disease. These experiments were discontinued in the middle of June, owing to the cessation of plague.

(*b*) It was asserted by Hankin, who cites Roux to the same effect, and the statement was again made by Walton from experiments performed for the Indian Plague Commission, that the direct inoculation of plague from rat to rat, without intermediate culture, led to such a diminution of virulence that it was impossible to continue the disease in this manner. Otto, on the other hand, found no great difficulty in continuing to propagate the disease for forty or fifty generations with tame rats. The importance of this statement from an epidemiological point of view is obvious, and Captain Liston and Dr. Petrie have repeated these experiments on the ordinary Indian rats. They have carried the disease through thirty generations direct from rat to rat with only one break. By passage, the virulence of the organism rapidly attains a constant level, which is maintained. It appears to maintain its virulence by this rat passage for the other laboratory animals as well as for rats.

(*c*) Mr. Rowland has been working at the anatomy and physiology of the sucking apparatus and alimentary mechanism of the rat flea and rat louse, and the life history of these parasites. He has also made many experiments concerning the breeding and keeping of these insects in captivity. He has, I think, accomplished the necessary work on the

structure and physiology of these parasites. Much, however, remains to be learnt regarding the exact conditions necessary for their continued existence in captivity.

(*d*) The fate of *B. pestis* in the alimentary canal of fleas has not been systematically investigated, as successful observations on this point necessitate being able to cause a flea to feed upon reasonably septicæmic blood and keep him in health for several days afterwards. It appears, however, that in most cases the bacilli disappear in the stomach within a few days, but that in a small percentage they multiply greatly. Under these last circumstances the fæces are full of *B. pestis*.

(*e*) The experiments on the infection cf animals by means of fleas have been of two kinds—

(i.) Indirect experiments.

(ii.) Direct experiments.

In the former a number of animals, *i.e.*, guinea-pigs or rats, some inoculated with plague, others healthy, lived together with and without the presence of fleas. These experiments have given positive results in the presence of fleas in two cases. The experiments in which fleas were excluded were negative. In both cases the floors were not cleansed and the excretions from the sick animals contaminated the food of the healthy. The animals were not allowed to eat the carcases of their dead comrades. These experiments, together with others of a similar character, are being repeated and will be repeated many times. The other way in which the problem of the *rôle* of the flea is being attacked is by the direct method, viz., allowing healthy fleas to feed upon septicæmic animals, and subsequently at intervals upon series of healthy animals (in fact, repeating somewhat the same technique as has been adopted in the case of mosquitoes and the malaria organism, and the tsetse-fly and trypanosomes). Great and unexpected difficulties have been met with in these enquiries. Many have been already overcome by Mr. Rowland, and I have no doubt that the remainder will be surmounted. So far, all direct experiments, as has been the experience of so many observers, have led to negative results, but I do not consider that a command of the proper conditions has yet been attained. Until one is satisfied upon this point it is useless to draw conclusions.

(*f*) Cultures have been obtained of as many as possible of the hæmorrhagic septicæmias to which various animals are susceptible, as these in some cases present similarities to *B. pestis* as regards either their morphological appearance or their pathological effect upon certain animals. All of these (twenty-two in number) are being compared with *B. pestis* as to their cultural characteristics and pathogenicity when introduced by different avenues into a variety of animals.

(*g*) Experiments have also been made to determine the ease with which the virulence of some strains of *B. pestis* which had disappeared owing to long-continued saprophytic existence could be revived,

Looking back upon the labours of the Commission since May 20th, and bearing in mind that it is only within the last weeks that the staff has assumed its present proportions, I feel satisfied with the work that has been accomplished. Laboratories have been equipped, a selected subsidiary staff has been got together, extensive epidemiological inquiries have been organised and started, and a number of lines of experimental inquiry have been opened up, some of which have been successfully exploited.

Of the industry and enthusiasm of my colleagues under what were sometimes trying circumstances I cannot speak too highly, and I consider that whatever measure of success has been accomplished in launching the work of the Commission, is in a large part due to the keenness and excellent organising abilities of Captain Glen Liston.

Before concluding this report I desire to record the valuable assistance and continuous courtesy which the Commission has received ever since they began work at Bombay, from both Lieutenant-Colonel Bannerman, Director of the Plague Research Laboratory, Parel, and from Dr. Turner, Medical Officer of Health, Bombay. Owing to Colonel Bannerman's help the task of organising and starting the inquiries has been greatly facilitated, and without the co-operation of Dr. Turner many of our inquiries would have been impossible.

Review.

REPORT TO THE GOVERNMENT OF BRITISH HONDURAS UPON THE OUTBREAK OF YELLOW FEVER IN THAT COLONY IN 1905, TOGETHER WITH AN ACCOUNT OF THE DISTRIBUTION OF THE *STEGOMYIA FASCIATA* IN BELIZE, AND THE MEASURES NECESSARY TO STAMP OUT OR PREVENT THE RECURRENCE OF YELLOW FEVER. By Rubert Boyce, F.R.S. Printed by Waterlow and Sons, Ltd., London Wall, London, 1906.

This report deals with the outbreak of yellow fever in British Honduras under the following headings: The Yellow Fever Epidemic in Belize; Prophylactic Measures against Yellow Fever; Mosquito Survey of the Town of Belize; Water Supply of the Town of Belize; General Sanitation of the Town of Belize; The Prevalence of Malaria in Belize and in other Districts of British Honduras; Report upon the three Principal Towns other than Belize; Yellow Fever in Mexico and in the Central American Republics, with Special Reference to the Fruit Ports; The Shipping Trade of Belize and the Relationship of Trade Routes to the Distribution of Yellow Fever; Quarantine Administration in British Honduras; Federal and State Quarantine in the United States; International Sanitation of the Pan-American Republics, 1905, and the West

Indian Inter-Colonial Sanitary Convention, 1904 ; and a Note on Sanitary Control in Mexico and the Central American Republics.

Nothing but praise can be said for the very careful and thorough way in which the subject has been treated. The Report is well got up, and the text covers nearly one hundred pages. There are several maps, and thirteen excellent plates at the end illustrative of houses in Belize, showing kerosene tins and barrels for conducting and storing the water, and the nature of the country, pools, marshes, drains, canals, quarantine stations, &c.

It is a most interesting and instructive Report, and is a valuable addition to the literature on yellow fever.

The above report has now been published as **Memoir xix.** of the Liverpool School of Tropical Medicine, and printed by Williams and Norgate, 14, Henrietta Street, Covent Garden, London. Price 5s. net.

Current Literature.

Hygiene of the Feet and Fitness for Marching.—In *Le Caducée* for February 3, 1906, Dr. Fritz Ask contributes an interesting article translated from Dr. Klefberg's paper in the *Tidskrift y Militar Halsovard.* Dr. Klefberg states, "If it be an uncontested truth that the efficiency of strategic formations depends on the *manner* in which they are accomplished; if it be true that modern warfare entails on infantry unceasing marching and counter-marching; if it be true, consequently, that only those who are *most fitted for marching* are the ones who have the best chances of bringing victory to their colours, it must follow according to all logic that the directly opposite must also be true; which amounts to this formula, which is terrible in its simplicity: the army which is least capable of marching, or which drags on towards the enemy with half its ranks filled with men with torn feet, is already condemned beforehand to defeat, however well armed it be. Rational marching and the hygiene of the feet are the Alpha and Omega of the infantry." A description now follows of the lesions due to drill, such as œdema of the feet, metatarsal syndesmitis, and periostitis following on fatigue. It behoves the modern army-surgeon, with due support from the military authorities, to anticipate these foot-lesions and other complaints, such as blisters, sweating of the feet, &c.

The hygiene of the feet comes under two headings, which are closely connected : the hygiene of the foot and that of the boot.

With regard to the hygiene of the feet, the medical recruiting officer, when passing a man as fit for service, should take the greatest care that no recruit with defective feet is posted to the infantry. Recruits should at once be taught how to take care of their feet in accordance with a printed list of rules.

The nature of the boot, its shape, and its quality are also of the first importance. As a general rule, a boot should only be considered as *natural* when its greatest length corresponds with Meyer's line, and its

greatest breadth with Starcke's line, and when it is specially fitted to its own foot, whether right or left [Meyer's line extends longitudinally along the sole of the foot and passes through the middle of the heel and the middle of the great toe. Starcke's line passes through the bases of the five metatarsal bones, and is therefore somewhat oblique with regard to the axis of the foot]. The heel of the boot should be especially resistant, not higher than one inch at the utmost, and sufficiently long and broad to support the whole of the heel; india-rubber heels would be cheaper and more resisting than those made of leather, and would facilitate marching. Of the two kinds of boots—laced ankle-boots and long-boots—the former are cheaper, more easily put on, and easier to dry; long boots protect one better against damp, cold, dust, and injuries. Not only the boots, but also the socks should have a *natural* shape, and be especially made for each foot; for this reason both boots and socks should always be supplied by Government.

Dr. Klefberg now sums up the conditions which he considers should be carried out to increase efficiency for marching (N.B.—I have given these briefly, J. E. N.): (1) Recruits, especially for the infantry, should be most carefully examined as to whether their feet and legs are in such a condition that they can be pronounced as being thoroughly fit for service; (2) the authorities, both military and medical, should devote special attention to the rational hygiene of the feet, so as to prevent any lesions, as far as this is possible; (3) a hospital orderly, specially trained in diseases of the feet, should be permanently appointed for this exclusive duty with *each* company; (4) surprise inspections should be made frequently, when both feet and boots will be carefully examined, and any neglect will be treated as a military crime; (5) only regulation boots and socks will be allowed to be worn, and these are to be made on *natural* models; (6) to admit of a quick distribution of easy-fitting boots on mobilisation, in each man's small-book will be noted the length, the width, and the circumference of each boot. These measurements will be legibly marked on the side of the boots in store for mobilisation purposes; (7) œdema of the foot, syndesmitis, and periostitis resulting from fatigue, shall be duly shown in our Nomenclature of Diseases, and shall be specially shown in returns. Patients suffering from these last two ailments shall, under no circumstances, be allowed "up," but must be treated as "bed" cases; (8) recruits, who for some reason or other, find a difficulty in learning their drill, instead of being repeatedly "excused duty," should be made to undergo a course of training more fitted for their capabilities, under the conjoint control of the military and medical authorities; (9) a soldier who has repeatedly shown himself to be unfit for infantry duties, should, instead of being invalided out of the service, and if otherwise fit for military duty, be posted to another branch of the service—say the commissariat—and there made to serve out his time.

J. E. NICHOLSON,
Lieutenant-Colonel (R. P.)

Diphtheria and Vincent's Angina.—Dr. J. Priestley (*Public Health*, February, 1906), reports an outbreak of sixty-four cases of mild diphtheria and Vincent's angina which occurred in an institution in which about 600 children and their attendants resided. There were no deaths.

Fifty-two showed clinical symptoms of diphtheria. In the remaining twelve the diagnosis was based solely on bacteriological examination. The descriptions of the micro-organisms found are as follows:—

(1) *The Diphtheria Bacillus.*—Delicate, slender, even rods, arranged in parallel groups, 3-5 μ long, 1 μ wide. Devoid of motility, staining with methylene blue segmentally and polarly, retaining their colour under Gram, and giving the characteristic dots by Neisser's method, acidifying glucose media, pathogenic to animals. Also involuted diphtheria bacilli which stained atypically with methylene blue and Neisser, and were non-pathogenic to animals.

(2) *Hoffmann's Pseudo-diphtheria Bacillus.*—Short rods, 1-2 μ long, which stain evenly with methylene blue and not in the manner characteristic of diphtheria bacilli with Neisser, produce no acid in glucose media, and non-pathogenic to animals.

(3) *Vincent's Organisms.*—(*a*) Spindle-shaped pointed rods, 6-12 μ long, 1-1·5 μ wide, which do not retain the stain with Gram, and can be cultivated on the usual media; (*b*) spirilla, long and thin, endowed with active motility; difficult to stain; cultures unobtainable.

The diphtheria bacillus was found in the secretions of the throat, or nose, in fifty-nine out of the sixty-four cases. Vincent's bacilli and spirilla in two. Diphtheria bacilli and Vincent's organisms in three. The origin of the epidemic was traced to a mother who harboured involuted diphtheria bacilli in her throat. She infected her five children, who spread the disease through the institution. Dr. Priestley insists on the importance of the isolation of all persons in whom either diphtheria or Hoffmann's bacilli are found. No individual should be deemed free from danger until after three successive negative examinations of nose and throat. Convalescents should be quarantined before mixing with other persons. He is of opinion that the diphtheria bacillus can lose its virulence, which it may regain under an altered environment. The individuals who carry these bacilli without evincing any symptoms themselves, require strict isolation.

C. Birt.

The Value of Examination of the Blood during Typhoid Fever.—(By John Atkins, M.B., F.R.C.S., *Medical Press*, November 22, 1905). This refers mainly to help from the leucocyte count in the diagnosis of perforation. The author relates the case of a well developed man, aged 24, who, on the fifteenth day of the illness, in which meteorism had been a prominent feature, suddenly developed symptoms of collapse. Three causes were believed to be possible: (1) Hæmorrhage. Sufficient bleeding to account for the collapse was excluded by (*a*) the fact that no blood was passed per rectum, and (*b*) the specific gravity of the blood was 1052; (2) Perforation. Physical signs were not contradictory, but a blood count showed 7,000 leucocytes per cubic millimetre, which was believed to "strongly contraindicate perforation," as the patient was a strong man in whom early leucocytosis would have been expected if perforation had occurred. Blood counts were continued every hour for fifteen hours, and in no instance did the leucocytes exceed 9,000 per cubic millimetre; (3) Cardiac failure. The case was treated as one of cardiac failure, and made an excellent recovery.

[One may, however, note that, setting aside probable causes of a poly-

nuclear leucocytosis, such as pneumonia and suppuration (which can obviously be frequently excluded), a polynuclear leucocytosis is not invariable after perforation, nor where present does it always occur sufficiently quickly to be useful in an urgent matter of diagnosis. Thoinot says that the leucocytic count forms only one element in the diagnosis of perforation, but cannot be assumed to clear up all the difficulties, and in particular, that the absence of a polynuclear leucocytosis should not be used as a ground for the rejection of the diagnosis of perforation. Osler's view is the same.]

R. J. S. SIMPSON.

Correspondence.

FINAL REPORT ON THE TREATMENT OF VENEREAL DISEASE AND SCABIES IN THE ARMY.

TO THE EDITOR OF THE "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

SIR,—In reading over the "Final Report" on the treatment of veneral diseases, the formula for mercurial cream given therein is one in which 1 ounce of metallic mercury is suspended in a total bulk of 10 ounces of cream. This is supposed to be of such a strength that 1 grain of metallic mercury is suspended in 10 minims of the cream.

Now it is well known that articles not in solution are sold and purchased by avoirdupois weight = 437·5 grains in the ounce. Liquid articles, however, contain 480 minims in the ounce. The total bulk, therefore, of a 10 per cent. suspension in which 1 ounce of metallic mercury is contained should be 9 ounces 55 minims, and not 10 ounces.

I have the honour to be, Sir,

Your obedient servant,

E. ECKERSLEY,

Major, R.A.M.C.

Sialkot, India,

March 31*st*, 1906.

[NOTE.—The writer has overlooked the fact that in the formula criticised the troy sign (℥i., not 1 oz.) is used for the amount of mercury, and it is thereby indicated that the troy and not the avoirdupois weight of mercury should be used in compounding the cream. The proportion of 1 grain of mercury in 10 minims of the cream is therefore correct.—EDITOR.]

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JOURNAL

OF THE

ROYAL ARMY MEDICAL CORPS.

Corps News.

JANUARY, 1906.

ROYAL ARMY MEDICAL CORPS.—GAZETTE NOTIFICATIONS.

The undermentioned Lieutenants are confirmed in that rank: Ryder P. Nash, Garfield Ormrod, M.B.

ARRIVALS HOME.—From Barbados: Lieutenant-Colonel H. C. Kirkpatrick. From India: Lieutenant-Colonel D. Wardrop; Major F. J. Morgan; Captains H. P. W. Barrow, E. T. F. Birrell, W. L. Bennett, J. A. Hartigan and A. H. Safford. From South Africa: Lieutenant-Colonel C. Birt and Captain G. H. Goddard. From Canada: Major A. Wright, and Captains J. H. Barbour and R. F. M. Fawcett. From West Africa: Captain A. W. Sampey.

ARRIVALS HOME ON LEAVE.—From India: Surgeon-General W. L. Gubbins, C.B., M.V.O.; Captains C. R. Evans and R. S. H. Fuhr, D.S.O. From Egypt: Lieutenant-Colonel G. D. Hunter, D.S.O. From South Africa: Captain W. M. McLoughlin. From Gibraltar: Captain E. E. Parkes.

EMBARKATIONS.—For India: Lieutenant-Colonels B. J. McCreery and J. M. F. Shine; Majors T. W. Gibbard and H. A. Hinge; Lieutenants J. Campbell, W. H. Hills, J. P. Lynch, W. G. Maydon and L. V. Thurston. For Mauritius: Lieutenant-Colonel A. Peterkin; Captain C. S Smith, and Lieutenants P. Power and G. S. Wallace. For Malta: Major C. C. Fleming, D.S.O., and Captain H. S. Anderson. For West Africa: Major G. T. Rawnsley and Captain J. McD. McCarthy.

POSTINGS.—Lieutenant-Colonel C. Birt to London District. Major F. J. Morgan to Netley. Majors A. Wright and A. C. Fox to Southern Command. Captains H. P. W. Barrow, R. F. M. Fawcett, G. H. Goddard and A. H. Salford to Eastern Command. Captain J. H. Barbour to Irish Command. Captains E. T. F. Birrell and J. A. Hartigan to Aldershot Army Corps. Captain W. L. Bennett to Scottish Command. Major R. F. E. Austin to Chatham.

Quartermaster and Honorary Lieutenant T. J. Jacomb has been placed under orders for South Africa. Quartermaster and Honorary Lieutenant H. Spackman proceeded to South Africa on November 17 in exchange with Quartermaster and Honorary Lieutenant A. Morrison.

EXCHANGES.—Major R. F. E. Austin and Captain H. S. Anderson (as a special case); Lieutenant-Colonels R J. Geddes, D.S.O., and G. F. Gubbin; Major J. J. Gerrard and Major C. W. Reilly.

TRANSFERS TO HOME ESTABLISHMENT.—Captain A. D. Waring, from India.

CHANGES OF STATION AT HOME.—Lieutenant-Colonel R. J. Geddes, D.S.O., from Scotland to Aldershot; Major R. H. Penton, D.S.O., from Southern to Northern Command.

LIST OF CASUALTIES :—

Transfers from other Corps.—7342 Staff-Sergeant C. Perry from Manchester Volunteers; Private Bradford from Derby Regiment.

Transfers to Army Reserve.—12163 Corporal J. T. Jones, 18072 Private C. H. W. Westlake, 18085 Private F. Carew, 18086 Private G. Fry, 18088 Private A. Burridge, 18101 Private E. Remnant, 18100 A. T. Leutchford, 18095 Private T. O'Donnell, 18103 Private A. Walker, 18112 Private J. Rowbotham, 11619 Private W. G. Davis, 18123 Private L. Dickinson, 18119 Private G. A. Borpe, 18104 Private H. L. Granhold, 18127 Private J. Abberton, 18155 Private W. Harris, 18142 Private H. A. Manley, 18117 Private T. J. Bradley, 18135 Private W. Armstrong.

Transfers to other Corps.—19788 Private J. H. Saxon to 5th Lancers, 19752 Private E. Warren to Royal Engineers.

Discharges.—2633 Sergeant-Major W. J. Feavor, termination of engagement; 5065 Staff-Sergeant C. Moore, termination of engagement; 5288 Staff-Sergeant J. Kenny, termination of engagement; 11368 Private E. G. Berry, medically unfit; 10263 Private H. P. Payne, termination of first period; 15988 Private G. Baldwin, termination of engagement (A.O. 106); 12036 Private T. Parry, medically unfit; 7228 Private W. Slater, after eighteen years; 19918 Private J. W. Shiel, free with less than twelve years.

Deaths.—16465 Private A. E. Griffen, at Valletta, Malta, of Mediterranean fever.

Disembarkations from Abroad.—Barbados to England, per R.M.S. "Tagus": 17557 Corporal P. Harvey, 11617 Private T. H. Blenkin, 17313 Private J. Smith.

Halifax, Nova Scotia, to England, per s.s. "Canada," on withdrawal of troops from Station: 1233 Sergeant W. J. Webster, 16448 Private A. Buchan, 18254 Private A. W. Wright, 16303 Private H. Cunningham.

Halifax, Nova Scotia, to England, per s.s. "Kensington," on withdrawal of troops from Station: 8366 Sergeant-Major F. C. Collard, 16751 Corporal J. Leighton, 9694 Corporal H. Wicks, 12518 Private H. Gale, 11392 Private E. Conner, 18509 Private J. McFarland.

Gibraltar to England: 17042 Private D. Miller, 11756 Private H. Pryer.

South Africa to England, per s.s. "Dilwara": 11862 Sergeant H. W. Rose, 8169 Corporal W. H. Allen, 14869 Corporal J. Bloor, 12815 Corporal G. Burgess, 15945 Corporal A. J. Dockerill, 14973 Corporal E. Lacy, 14609 Corporal W. P. Oldridge, 12965 Corporal H. E. Tyler, 14356 Private W. L. Wyse, 12796 Private R. Atkinson, 11838 Private C. Banks, 17057 Private P. Barnes, 17322 Private M. J. Boland, 12992 Private R. F. Bolt, 16923 Private J. Chesters, 12606 Private P. Clements, 17607 Private S. H. Evans, 13083 Private A. E. Fayer, 16858 Private S. Furniss, 13728 Private C. W. Gifford, 14067 Private G. H. Green, 12940 Private S. Harrington, 15937 Private E. N. Hobday, 12739 Private T. Holloway, 12641 Private A. H. Hurst, 12888 Private C. McCaw, 18954 Private F. Stanley, 18913 Private W. E. Stanley.

Embarkations for Abroad.—England to Bermuda, per s.s. "Soudan": 17937 Lance-Corporal P. A. Kirby, 17473 Private G. A. Allsop, 17684 Private W. Malleson, 17677 Private G. Sheldron, 13832 Private J. Wayte, 17742 Private A. T. Platt, 17051 Private W. E. Potts, 16315 Private A. F. Gibbs, 11814 Private A. E. Harrington.

England to South Africa: 10125 Sergeant T. Gibbs, 18805 Private W. Charlton, 17842 Private E. Ainsworth.

England to Malta: 10941 Corporal T. Moody, 15648 Corporal E. J. Hill, 17091 Private J. Ellis, 16878 Private R. McCaig, 16913 Private J. Darby, 17054 Private A. Altoft, 17450 Private W. J. Elsey, 19422 Private C. Denham, 19416 Private T. E. Harper, 17965 Private J. J. Thompson, 17303 Private A. Auchterlonie, 18002 Private W. Beard, 16292 Private J. Pegram, 17657 Private E. G. Inns, 18671 Private S. Thackeray, 19547 Private W. A. Mansell, 19244 Private F. J. James, 12393 Private M. Rowland, 19183 Private E. Millwood, 12121 Private C. W. H. Mean.

England to Malta, per s.s. "Soudan": 19407 Private J. Walter, 18335 Private W. J. Woolway, 19160 Private C. J. Preston, 19075 Private A. S. Shelton, 18666 Private J. James, 19186 Private T. E. Smith, 18234 Private R. J. Gibbons, 16768 Private H. E. Barton, 19308 Private T. Carpenter, 19035 Private J. T. Young, 19193 Private W. M. Stebbings.

England to Gibraltar, per s.s. "Soudan": 17883 Private A. Highman, 16835 Private J. H. Ferris, 18656 Private H. G. Maywood, 19500 Private C. Hudson, 19261 Private A. T. Croft, 17924 Private C. Schofield, 18474 Private C. Keely, 15289 Private H. R. T. Rodman, 18733 Private A. Mackenzie, 17577 Private A. E. Lawrence, 18203 Private W. Houghton, 18477 Private P. Leary.

The following have passed the Examinations stated:—

For Quartermaster-Sergeant.—10566 Staff-Sergeant B. C. Dring, 8503 Staff-Sergeant J. L. Driver, 10200 Staff-Sergeant J. H. Thomas, 8284 Staff-Sergeant J. Southwood 8299 Staff-Sergeant E. C. Bowen, 10993 Staff-Sergeant P. S. A. Reynolds, 9801 Staff-Sergeant H. Duff, 9624 Staff-Sergeant W. N. Speedy.

For Staff-Sergeant.—8299 Staff-Sergeant E. C. Bowen, 8503 Staff-Sergeant J. L. Driver, 9800 Staff-Sergeant W. C. Renton, 9801 Staff-Sergeant H. Duff, 14290 Sergeant W. H. Scott Badcock, 8288 Sergeant M. Andrews, 10711 Sergeant F. W. Sharpe, 10544 Sergeant T. W. Granger, 8587 Sergeant J. Connell, 12146 Sergeant W. J. Wilson, 11107 Sergeant P. G. Hambrose, 10296 Sergeant H. A. Bangert, 9039 Sergeant E. Potter, 11214 Sergeant W. E. Squire, 10125 Sergeant T. Gibbs.

For Sergeant.—10074 Sergeant H. Wilkins, 11714 Sergeant E. Kerstein, 14602 Lance-Sergeant J. Hughes, 10736 Lance-Sergeant G. Gray, 11089 Lance-Sergeant F. S. Field, 12510 Lance-Sergeant F. J. Redwood, 17933 Corporal D. E. Dean, 18145 Corporal L. H. Elliott, 11952 Corporal A. E. Malley, 10830 Corporal A. Davidson, 9207 Corporal N. Hillier, 11538 Corporal J. Bannister, 12519 Corporal R. E. Halford, 17644 Corporal H. E. Hart.

For Corporal.—14512 Private J. Widdall, 11789 Private W. Skinner, 17210 Private C. E. James, 19862 Private L. R. Tale, 18170 Private L. Sufrin, 18830 Private F. Bell, 19471 Private D. C. Johnston, 11814 Private A. E. Herington, 17022 Private A. R. Weaver, 17730 Private P. Wills, 10766 Private D. Osborne, 17303 Private A. Auchterlonie, 19121 Private T. Cook, 12002 Private W. J. Knee, 17632 Private H. C. A. Lunn, 11402 Private E. Stokes, 17691 Private A. Shearon, 18577 Private F. L. Read, 19197 Private W. K. Lethbridge, 18939 Private J. E. French, 18569 Private C. Calbert, 10926 Private E. Dover, 15655 Private G. J. Caborn, 15288 Private W. C. Prince, 17180 Private E. A. Norwood, 17832 Private F. Harman, 18969 Private E. Gray, 9538 Private J. Keating, 18192 Private M. Harlen, 18110 Private R. W. Gibson, 18153 Private E. E. Beadle.

Passed as Compounders.—8534 Lance-Sergeant W. James, 17933 Corporal D. E. Dean, 13666 Corporal W. C. Hughes, 11816 Corporal L. A. Shepherd, 9405 Corporal C. Valance, 12340 Lance-Corporal T. Butler, 17260 Lance-Corporal G. W. Payne.

NOTES FROM SHORNCLIFFE CAMP.—Major E. C. Anderson, R.A.M.C., writes (November 27, 1905): "Our Annual Inspection has come and gone. Colonel Lloyd, V.C., our new Administrative Medical Officer, after he had inspected the detachment on parade, presented the prizes to the successful candidates at the recent examination held at the termination of the last anatomy class. Lieutenant-Colonel Martin, R.A.M.C., gave the three prizes, which were gained by: 1st prize, Private Collins, R.A.M.C.; 2nd prize, Private Bodger, R.A.M.C.; 3rd prize, Private Mangel, R.A.M.C.

"There is every prospect of a successful football season this year; so far the team has won three matches, drawn one, and lost one. The last was most unfortunate, and was largely due to the referee, who played a strong game throughout for our opponents, in fact, scoring the goal which gave them the match."

NOTES FROM CEYLON (November 1, 1905).—"Lieutenant-Colonel R. D. Hodson, Captain L. M. Purser, and Captain T. B. Unwin, R.A.M.C., are under orders for England, tour expired, and will probably leave Ceylon on January 3, 1906, in His Majesty's Transport "Dunera." Lieutenant-Colonel G. H. Sylvester, Captain E. C. Hayes, and Lieutenant C. R. Miller, R.A.M.C., are expected by the same boat on November 30, 1905.

"Lieutenant-Colonel G. H. Sylvester, R.A.M.C., takes over the Command of the Royal Army Medical Corps and Senior Medical Officer of the Troops in the Ceylon Command. Captain E. C. Hayes and Lieutenant C. R. Miller, R.A.M.C., will be stationed in Colombo, the former performing the duties of Sanitary Officer in addition to ordinary duty.

"The under-mentioned Non-Commissioned Officers have passed the necessary examination as Compounders of Medicine: 18713 Corporal W. H. Ellis, R.A.M.C.; 18233 Corporal D. C. Evans, R.A.M.C."

NOTES FROM SIERRA LEONE.—Captain H. W. Grattan, R.A.M.C., writes (November 24, 1905): "Captain W. H. S. Nickerson, V.C., arriv d on November 23, for a tour of service.

"On November 7 we visited a Creole village a few miles from Mount Aureol with Dr. Latchmore (Colonial Medical Service). It is customary in this village for the arrival of the Medical Officer (who attends twice weekly) to be proclaimed by the tolling of the church bell. The native parson had previously announced from the pulpit that we were coming to inspect people with enlarged glands. We found trypanosomes in the glands of a child who had lived all his life in this village. On November 8, Dr. Hood asked us to see a fresh case in the Colonial General Hospital. We found trypanosomes in the glands and cerebro-spinal fluid.

"In honour of the King's birthday, the troops in garrison paraded at Wilberforce on November 9. The white gunners marched down from Mount Aureol, and then came up by train to Wilberforce. Just before the *feu de joie* a company of the West India Regiment was attacked by a large army of driver ants. Orderlies were seen rushing about with tins of kerosine oil, which they poured on the ants and finally dispersed them sufficiently for the parade to commence. The special train which brought spectators from Freetown arrived after the parade was over. Several photographs of the review were taken; we are informed that owing to the excitement of the moment, the photographer took most of them on the same plate. In the afternoon a reception was held at Government House.

"On November 11 we found trypanosomes in the glands of 2783 Private Momodu, West African Regiment, at Wilberforce. This is the fourth case in this regiment. On November 14, Drs. Hood and Renner brought to our notice another fresh case of trypanosomiasis. We found trypanosomes in the glands, finger blood, and cerebro-spinal fluid. On November 17, while selecting a new site for officers' quarters at Port Lokkoh, we noticed a sad-looking native in a ricefield. We found a trypanosome in his cervical glands. To-day we found trypanosomes in the glands of the servant of Major H., R.A."

NOTES FROM SIMLA (INDIA).—Captain E. Blake Knox, R.A.M.C., Secretary to the Principal Medical Officer, His Majesty's Forces in India, writes (November 23, 1905):—

"*Appointments.*—Lieutenant-Colonel A. W. P. Inman, M.B., R.A.M.C., to officiate as Principal Medical Officer, 8th (Lucknow) Division, *vice* Colonel G. D. N. Leake, R.A.M.C., granted leave out of India. Lieutenant-Colonel J. R. Dodd, R.A.M.C., to officiate as Principal Medical Officer, Bareilly and Gharwal Brigades, *vice* Colonel G. J. Kellie, I.M.S., appointed to officiate as Principal Medical Officer, 7th (Meerut) Division. Colonel H. R. Whitehead, R.A.M.C., to officiate as Principal Medical Officer, 2nd (Rawal Pindi) Division, *vice* Colonel B. M. Blennerhassett, C.M.G., R.A.M.C., granted six months' sick leave out of India. Lieutenant-Colonel D. O'Sullivan, R.A.M.C., to officiate as Principal Medical Officer, Abbottabad and Sialkot Brigades, *vice* Colonel Whitehead, R.A.M.C., transferred to Rawal Pindi temporarily. Lieutenant-Colonel D. O'Sullivan has also been confirmed in the Command of the Station Hospital, Rawal Pindi, with effect from November 4, 1905. Captain W. R. P. Goodwin, R.A.M.C., to be Personal Assistant to Principal Medical Officer, Northern Command, *vice* Captain E. T. F. Birrell, R.A.M.C., vacated. Lieutenant S. C. Bowle, R.A.M.C., to be Dental Specialist in Western Command.

"*Postings.*—The undermentioned officers nominated for duty in the Northern Command have been posted to stations noted against their names: Major R. Holyoake, Ambala; Lieutenant A. W. Gater, Rawal Pindi.

"*Transfers.*—Major H. B. Mathias, D.S.O., has been detailed for transfer to the 1st (Peshawar) Division. Major J. S. Edye has been transferred from Ambala (Northern Command) to Meerut (Eastern Command). Major L. P. More, has been transferred from the Eastern to the Northern Command, and posted to the 2nd (Rawal Pindi) Division.

"*Embarkations.*—The following officers sailed for England, tour expired, on November 4, 1905: Lieutenant-Colonel D. Wardrop, Major F. J. Morgan, Captain H. P. W. Barrow, Captain J. A. Hartigan. November 24, 1905: Lieutenant-Colonel C. W. Johnson, Captains G. Carroll, M. P. Corkery.

"*Leave.*—Colonel B. M. Blennerhassett, C.M.G., R.A.M.C., granted six months' sick leave out of India."

EXAMINATIONS.

Officers of the Royal Army Medical Corps, examined in India, October, 1905.

Rank	Name	Examined in	Results
Lieutenant-Colonel	Molesworth, R. E. ..	(d) ii., 2 (3 and 4), 5	Passed.
Major	Marks, G. F. H. ..	(3 and 4)	,,
,, ...	Thacker, R. C. ..	,, ...	,,
,, ...	Hallaran, W.	2 (3 and 4), 5	,,
,, ...	Inniss, B. T.	(d) ii.	,,
,, ...	Hall, F. W. G. ..	,, ...	,,
,, ...	Poole, W. C.	,, ...	,,
,, ...	Withers, S. H. ..	,, ...	,,
,, ...	Scott, G.	2 (3 and 4), 5	,,
,, ...	Russell, J. J.	(d) ii.	,,
,, ...	Scott, B. H.	,, ...	,,
,, ...	Bate, A. L. F. ..	(d) ii., 2 (3 and 4), 5	,,
,, ...	Dowman, W. S. ..	,, ,, ,, ...	,,
,, ...	Hale, C. H.	2 (3 and 4), 5	,,
Captain	Barrow, H. P. W. ..	(d) ii.	,,
Lieutenant ..	Bramhall, C.	(h) ii. and iii.	,,
,, ..	Brown, G. H. J. ..	,, ,, ...	,,
,, ..	Collins, P. T.	(d) ii. (h), ii. and iii.	,,
,, ..	Wood, A. E. B. ..	(d) ii.	,,
,, ..	Pallant, S. L... ..	(d) ii. (h), ii. and iii.	,,
,, ..	Coates, T. S.	,, ,, ,, ...	,,
,, ..	Ahern, M. D.	,, ,, ,, ...	,,
,, ..	Smallman, A. B. ..	(d) ii.	,,
,, ..	Tyndale, W. F. ..	(d) ii. (h), ii. and iii.	,,
,, ..	Otway, A. L.	,, ,, ,, ...	,,
,, ..	Bridges, R. H. ..	,, ,, ,, ...	,,
,, ..	Fairburn, J.	,, ,, ,, ...	,,
,, ..	Reed, G. A. K. H. ..	,, ,, ,, ...	,,

NOTES FROM SINGAPORE, STRAITS SETTLEMENTS.—Lieutenant-Colonel W. Dick, R.A.M.C., writes (November 2, 1905): "The following officers are tour expired: Lieutenant-Colonel W. Dick, Major J. H. E. Austin, and Captain G. F. Sheehan. Notification has been received that these officers are to be relieved in December by Lieutenant-Colonel H. H. Johnston, C.B., Major C. B. Martin, and Lieutenant G. A. D. Harvey. Major J. Ritchie, who was also tour expired, has been permitted to extend his service in Singapore for another year. This officer has been doing excellent sanitary work, he having been employed for a considerable time in the health department of the Municipality. A new ordinance regarding the registration of medical practitioners in the Colony has come into force, and a medical council of registration, which has under its care all medical matters, has been appointed, of which Lieutenant-Colonel W. Dick is an elected member.

"A medical school for the Colony has also been founded for the education of Chinese and other natives, granting diplomas for local practice. Lieutenant-Colonel W. Dick has been appointed Examiner in Surgery."

NOTES FROM STANDERTON, TRANSVAAL, SOUTH AFRICA (November 25, 1905).—"On July 3, 1905, Lieutenant E. M. Glanvill, R.A.M.C., and Mrs. Glanvill left the station for Barberton, where Lieutenant Glanvill has taken over the Command of the Military Hospital; he was succeeded here by Civil-Surgeons R. G. Griffin, who has since gone to Middelburg, Transvaal, J. Huntley Pelly, transferred to Harrismith, and J. Dalrymple, who came from Harrismith, and is at present the Medical Officer in Charge of the Cantonment.

"9518 Staff-Sergeant A. Johnson, R.A.M.C., Chief Clerk to Lieutenant-Colonel F. A. B. Daly, C.B., in No. 18 General Hospital, Charlestown, No. 15 General Hospital, Howick, and in the Military Hospital, Standerton, has taken over the duties of Steward; and 14369 Sergeant E. Newhouse, R.A.M.C., is Clerk to the Senior Medical Officer.

10296 Sergeant E. A. Bangert, R.A.M.C., is the present Compounder, having taken over this appointment from 9915 Sergeant E. Thuillier, R.A.M.C., who has been moved to Roberts' Heights, Pretoria, after a long period of service in Standerton. 17234 Sergeant W. Jones, R.A.M.C., Superintending Cook, has arrived from Devonport.

"The Transvaal Manœuvres were held between Heidelberg and Greylingstad, September 11 to 22, 1905, during which period the Military Hospital, Standerton, was the Base Hospital for the large forces engaged. Captain Jas. Waddell, R.A.M.C., and Lieutenant and Quartermaster W. G. Holway, R.A.M.C., were sent here for duty from Middelburg, Transvaal, returning to their station on the termination of the manœuvres.

"At a meeting of the Royal Army Medical Corps Sports Club on September 20, 1905, Captain L. Addams-Williams was elected Captain, Sergeant-Major G. Greensill Vice-Captain, and Corporal F. Dean Secretary of the Cricket Club for the season 1905-6. The first eleven consists of Captain L. Addams-Williams, Sergeant-Major Greensill, Sergeant Newhouse, Corporal Pugh, Lance-Corporal J. Whitley, Privates Dellar, Hillen, Johnson, Carroll, Light and Wellington. They have won three and lost two matches up to date. On the occasion of the last match, on November 17, with the 3rd Battallion Royal Warwick Regiment, Lieutenant-Colonel F. H. M. Burton and the Officers, Royal Army Medical Corps, held an "At Home," which was largely attended from the cantonment and town; the Band of the Royal Warwick Regiment discoursed a varied and pleasant selection of airs, which was much appreciated by the assembled guests.

"The Standerton Waterworks were opened on November 1, 1905, by Mr. W. L. Strange, M. Inst. C.E., Director of Irrigation. The works constructed for the water supply of Standerton include the following: (1) A weir across the Vaal River, constructed for hydrographic purposes by the Irrigation Department, but so designed that it will serve the Municipality by impounding eighty-five million gallons of water after the flow over the crest has stopped. (2) An intake tower about seven hundred yards above the weir, from which the supply pipe leads to the pumping station. (3) A pumping station, containing a double set of boilers, engines and pumps. (4) A rising main, one and three-quarter miles in length and of ten inches in diameter. (5) Two service reservoirs with a combined capacity of three hundred thousand gallons. (6) Distribution pipes extending to ten and a half miles, with valves, hydrants, &c. All the piping is socketted, lap-welded, steel tubes, and the joints have been made with lead and yarn. The works have been carried out at the expense of the Municipality. The total cost has been about £26,500.

"On November 3, 1905, Miss E. J. Martin, Q.A.I.M.N.S., the Acting Matron, and Miss E. A. Scantlebury, Q.A.I.M.N.S. (R.), proceeded to Cape Town for embarkation in His Majesty's Transport "Dilwara" for England.

"Miss Martin came to Standerton in August, 1900, with No. 4 Stationary Hospital, under the command of Major R. Kirkpatrick; this afterwards developed into No. 17 General Hospital, with 520 beds, and at the close of the war in South Africa became the present Military Hospital, Standerton, in the same buildings and on the same ground, but much reduced in size and *personnel*. The medical officers now doing duty in it are Lieutenant-Colonel F. H. M. Burton, Captain L. Addams-Williams, and Civil-Surgeon J. H. O'Sullivan.

The population of Standerton has now increased to 7,000, of whom some 3,000 are white. The writer of these notes remembers the place when it was only a "Dorp" compared with its present size. South Africa is indeed going full steam ahead in progress and prosperity."

QUEEN ALEXANDRA'S IMPERIAL MILITARY NURSING SERVICE.

The following ladies have received appointments as Staff Nurses: Miss J. G. Dalton, Miss E. B. Darnell, Miss M. German.

Appointments Confirmed.—Staff Nurses: Miss H. Hartigan, Miss M. J. Hepple, Miss E. M. Lang, Miss H. M. E. MacCartney, Miss E. M. Rentzsch, Miss K. Roscoe, Miss S. Richards.

Postings and Transfers at Home.—Sister: Miss E. M. Donne, on return from Indian Troopship duty (s.s. "Plassy"), to Royal Herbert Hospital, Woolwich. Staff Nurses: Miss E. L. McAllister, on return from Indian Troopship duty (s.s. "Plassy"), to Royal Victoria Hospital, Netley; Miss A. A. Steer, on return from Indian Troopship duty (s.s. "Plassy"), to Queen Alexandra Military Hospital, Millbank, S.W.; Miss J. S. G. Gardiner, on appointment, to Military Hospital, Chatham; Miss M. S. Williams, on appointment, to Military Hospital, Colchester.

Postings and Transfers Abroad.—Sisters: Miss B. N. Daker, from Queen Alexandra Military Hospital, Millbank, S.W., to s.s. "Plassy" for Indian Troopship duty; Miss A. Guthrie, from Pretoria to Middelburg, Cape Colony; Miss L. M. Todd from Maritzburg to Middleburg, Cape Colony; Miss M. E. Harding, Miss J. Hoadley, R.R. C., Miss F. M. Hodgins, Miss E. J. Martin, Miss A. Nixon, Miss S. I. Snowdon, to England on expiration of tour abroad.

ARMY MEDICAL RESERVE OF OFFICERS.

Surgeon-Major George M. Lowe, M.D., to be Surgeon-Lieutenant-Colonel, dated November 5, 1905.

Surgeon-Lieutenant-Colonel George H. Turnbull, M.D., having resigned his Commission in the Volunteers, ceases to belong to the Army Medical Reserve of Officers, dated December 6, 1905.

Surgeon-Captain Ernest H. Tipper, 1st City of London, Royal Garrison Artillery, Volunteers, to be Surgeon-Captain, dated December 9, 1905.

Surgeon-Lieutenant Hubert R. R. Fowler, 2nd Volunteer Battalion, The Worcestershire Regiment, to be Surgeon-Lieutenant, dated December 13, 1905.

ROYAL ARMY MEDICAL CORPS (MILITIA).

Lieutenant Herbert Hugh Blair Cunningham, Reserve of Officers (late Royal Irish Fusiliers), to be Lieutenant, dated December 2, 1905.

ROYAL ARMY MEDICAL CORPS (VOLUNTEERS).

London District: London Companies.—Captain L. N. Lloyd, D.S.O., Royal Army Medical Corps, to be Adjutant, *vice* Major T. W. Gibbard, M.B., Royal Army Medical Corps, whose tenure of that appointment has expired, dated November 1, 1905.

Northern Command: Manchester Companies.—Quartermaster and Honorary Lieutenant R. M. Chiswell resigns his Commission, dated November 22, 1905.

Captain W. M. Steinthall resigns his Commission, dated December 2, 1905.

Scottish Command: Aberdeen Companies.—Quartermaster and Honorary Lieutenant J. Innes resigns his Commission, dated December 2, 1905.

John Innes, M.B. (late Quartermaster and Honorary Lieutenant), to be Lieutenant, dated December 2, 1905.

Northern Command: Manchester Companies.—Quartermaster and Honorary Lieutenant T. Sherrat resigns his Commission, dated December 13, 1905.

Eastern Command: Maidstone Companies.—Quartermaster and Honorary Captain W. J. Saveall resigns his Commission, with permission to retain his rank, and to wear the prescribed uniform, dated December 13, 1905.

Northern Command: Leeds Companies.—Harold Collinson, M.B., to be Lieutenant, dated December 13, 1905.

Devon Bearer Company.—Alexander Ward Fortescue Sayres, Gent., to be Lieutenant, dated December 13, 1905.

IMPERIAL YEOMANRY.

Bedfordshire.—Surgeon-Lieutenant H. Skelding, M.B., to be Surgeon-Captain, dated September 12, 1905.

OTHER VOLUNTEER CORPS.

1st Durham, Royal Garrison Artillery (Volunteers).—Alan Ayre-Smith, Gent., to be Surgeon-Lieutenant, dated November 22, 1905.

2nd Volunteer Battalion, The Royal Scots Fusiliers.—Surgeon-Lieutenant L. Bowman, M.B., resigns his Commission, dated November 22, 1905.

1st Volunteer Battalion, The Duke of Cornwall's Light Infantry.—Krishna Moreshwar Pardhy, Gent., to be Surgeon-Lieutenant, dated November 29, 1905.

1st Middlesex (Victoria and St. George's) Volunteer Rifle Corps.—Surgeon-Captain F. J. McCann, M.D., resigns his Commission, dated November 13, 1905.

2nd Volunteer Battalion, The Highland Light Infantry..—Surgeon-Lieutenant J. F. Fergus, M.D., resigns his Commission, dated November 29, 1905.

15th Middlesex (The Customs and the Docks) Volunteer Rifle Corps.—Surgeon-Lieutenant-Colonel and Honorary Surgeon-Colonel F. W. Humphreys resigns his Commission, with permission to retain his rank and to wear the prescribed uniform, dated November 13, 1905.

7th Lancashire (The Manchester) Royal Garrison Artillery (Volunteers).—Surgeon-Lieutenant (Honorary Captain in the Army; Honorary Major, Militia) C. J. J. Harris,

M.D., from the 1st Surrey (South London) Volunteer Rifle Corps, to be Surgeon-Lieutenant, dated December 2, 1905.

2nd Volunteer Battalion, The Lincolnshire Regiment.—Surgeon-Lieutenant-Colonel G. F. England is granted the honorary rank of Surgeon-Colonel, dated December 2, 1905.

2nd (Hertfordshire) Volunteer Battalion, The Bedfordshire Regiment.—Surgeon-Captain (Surgeon-Captain, Army Medical Reserve of Officers) Thomas Beard, from the 4th (Stirlingshire) Volunteer Battalion, Princess Louise's (Argyll and Sutherland Highlanders), to be Surgeon-Captain, dated December 2, 1905.

3rd Lanarkshire Volunteer Rifle Corps.—Surgeon-Captain A. S. Tindal, M.D., resigns his Commission, dated December 2, 1905.

1st London (City of London) Volunteer Rifle Corps.—Surgeon-Captain H. B. T. Morgan, M.D., resigns his Commission, dated November 20, 1905.

1st Cadet Battalion, The King's Royal Rifle Corps.—Surgeon-Lieutenant St. J. F. Blake-Campbell to be Surgeon-Captain, dated November 20, 1905.

8th Lancashire, Royal Garrison Artillery (Volunteers).—Surgeon-Lieutenant C. E. M. Lowe resigns his Commission, dated December 13, 1905.

The Queen's Rifle Volunteer Brigade, The Royal Scots (Lothian Regiment).—Surgeon-Lieutenant R. Abernethy, M.D., resigns his Commission, dated December 13, 1905.

3rd (Cambridgeshire) Volunteer Battalion, The Suffolk Regiment.—Surgeon-Lieutenant-Colonel J. P. Atkinson, M.D., is granted the honorary rank of Surgeon-Colonel, dated November 1, 1905.

Surgeon-Lieutenant-Colonel and Honorary Surgeon-Colonel J. P. Atkinson, M.D., resigns his Commission, with permission to retain his rank and to wear the prescribed uniform, dated November 1, 1905.

3rd Volunteer Battalion, The Bedfordshire Regiment.—Surgeon-Lieutenant-Colonel D. Thomson, M.D. (Brigade-Surgeon-Lieutenant-Colonel, Senior Medical Officer, Bedford Volunteer Infantry Brigade), is granted the honorary rank of Surgeon-Colonel, dated December 13, 1905.

Surgeon-Lieutenant-Colonel and Honorary Surgeon-Colonel D. Thompson, M.D. (Brigade-Surgeon-Lieutenant Colonel, Senior Medical Officer, Bedford Volunteer Infantry Brigade), resigns his Commission, with permission to retain his rank and to wear the prescribed uniform, dated December 13, 1905.

Nelson Johnstone, Gent., to be Surgeon-Lieutenant, dated December 13, 1905.

1st Volunteer Battalion, the Prince of Wales's Volunteers (South Lancashire Regiment).—William Joseph Collings, Gent., to be Surgeon-Lieutenant, dated December 13, 1905.

4th (Perthshire) Volunteer Battalion, The Black Watch (Royal Highlanders).—Surgeon-Captain R. Stirling, M.D., to be Surgeon-Major, dated December 13, 1905.

3rd (Renfrewshire) Volunteer Battalion, Princess Louise's (Argyll and Sutherland Highlanders).—Surgeon-Captain W. D. Macfarlane resigns his Commission, dated December 13, 1905.

ADEN BOUNDARY COMMISSION.

The following copy of a letter is published for information :—

"*To the Secretary, War Office, London.*

"SIR,—I have the honour to bring to your notice for record that the undermentioned Royal Army Medical Corps Officer has been specially brought to notice for his good services with the Aden Column of the late Boundary Commission, by the Principal Medical Officer, Aden Brigade, and the Lieutenant-General Commanding Western Command :—

"Captain J. Tobin.

"I have the honour to be, Sir,

"Your most obedient servant,

"(Signed) T. J. GALLWEY.

"*Surgeon-General, A.M.S., for Commander-in-Chief in India.*

"*Army Headquarters, India, Medical Division,*

"*Simla, May* 11, 1905."

OPERATIONS AGAINST THE NIAM-NIAMS.

The Sirdar has just published a list of officers whose names have been brought to the notice of the Khedive for their good services in the recent operations against the Niam-Niams. Among others are Majors H. A. Bray and J. H. Rivers, and Captain F. J. Brakenridge, Royal Army Medical Corps.

REGISTER FOR INDIAN SERVANTS.

Few officers on going to India have not experienced the difficulty of getting good servants. The discomforts on arrival and of a long journey up country, unprovided with a bearer, or, what is worse, provided with a hastily selected man, taken haphazard from the crowd of indifferent or bad characters who congregate in Bombay, have fallen to the lot of most of us; whilst the period of trial and vexation, until a proper staff of servants is secured, is familiar to us all.

In our Corps, with regular annual reliefs, it should not be difficult to arrange for an interchange. Officers leaving India would then be able to provide places for the good and tried retainers they are relinquishing, and new arrivals would, by taking on these men, be spared many of the worries and troubles which now befall them. Further, good servants would not be lost to the Corps, and the prospects of continuous employment could not fail to have attraction for the better class of men.

With these ends in view, officers due home from India are requested to communicate to the Journal particulars of servants whom they can recommend, so that officers going out in relief may have an opportunity of securing these men. The particulars required are:—

(1) Class of servant.
(2) Whether for bachelor or married officer.
(3) District or station to which he belongs.
(4) Any special recommendations.

Note.—The date the officer leaves India should also be stated, and when and where the servant will be available.

Captain F. W. Cotton, R.A.M.C., Nowshera, writes (October 25, 1905), recommending his bearer, Chuddi Ram. Particulars as follows:—

(1) Bearer.
(2) For married officer.
(3) Nowshera or Peshawar District.
(4) For a native, is very honest. Speaks English well. Knows his work. Is fond of children. Good on the line of march. Will not do Khitmugar work in a Mess.

Lieutenant-Colonel W. G. Birrell, R.A.M.C., Edinburgh, writes (December 10, 1905), sending particulars of a servant—V. V. Soondarayaloo—lately employed by him as a butler:—

(1) Butler (Hindoo).
(2) Bachelor or married officer.
(3) 206, Old Poor House Road, Bangalore.
(4) Speaks English. Is honest, and an excellent servant. Was with Lieutenant-Colonel Birrell for six years. Is a good cook.

Lieutenant-Colonel G. E. Weston, R.A.M.C., Bermuda, writes (November 28, 1905), confidently recommending an Indian servant— Rama Sudu. Particulars as follows:—

(1) Was employed as butler, but managed entire household. With little assistance he looked after the house, clothes, horses and garden.
(2) Bachelor or married officer.
(3) Kamatipura Lane 5, Poona.
(4) Was employed in the service of Lieutenant-Colonel Weston all the time that he was in India, *i.e.*, from October, 1895, to January, 1902. Is honest and thoroughly trustworthy. Has cooked for him on the line of march. Speaks good English. Has lately been employed by Surgeon-General Gubbins.

LONDON COMPANIES (VOLUNTEERS).

Major T. W. Gibbard, who, a few days before, vacated the appointment as Adjutant to these Companies at the expiration of his three years' tenure, was the guest of the evening at a Mess Dinner at Headquarters on November 10. There was a full attendance of the officers to give him as good a send off as possible on his departure for India.

Lieutenant-Colonel Valentine Matthews, in proposing Major Gibbard's health, alluded to the devotion and zeal with which Major Gibbard had identified himself with everything tending to promote the efficiency of the London Companies, to the progress which had been made during his Adjutancy, and to the admirable relations which had existed between the late adjutant and all ranks of the Corps. As illustrative of this the speaker mentioned a remark which he had overheard in the ranks expressing sorrow that "old Gibbard was going, as he really belonged to us." He was quite sure that Major Gibbard took with him the good wishes of every member of the London Companies from Commanding Officer to Private.

The toast was received with the greatest enthusiasm, and with musical honours from both the Company and the Band.

Major Gibbard, in replying, said that it had been a pleasure to him to have held the Adjutancy, and that it was a great satisfaction to have got on well with all ranks, and that whatever had been his part in it, the work done and the progress made was by the Volunteers themselves. He thanked the officers for the way in which they had received the toast, and said that this was an occasion which he should always remember.

THE HARWOOD CUP.

This Cup was presented by Lieutenant-Colonel J. G. Harwood, R.A.M.C., for a football competition, open to the various Companies of the Corps. Since the season 1898-99, when it was won by No. 4 Company, Netley, no competition has been held. The entries for this season closed on September 29. Only seven companies have entered, viz., Nos. 1, 2, 3, 4, 6, 18 and 20. The draw for the first round took place at the Depôt on October 2, and resulted as follows, the first-named having choice of ground: No. 1 Company *versus* No. 20 Company; No. 6 Company *versus* No. 3 Company; No. 4 Company *versus* No. 2 Company; No. 18 Company a bye. The first round must be completed on or before November 29, and thus far No. 1 Company has beaten No. 20 Company by 3 goals to *nil*.

MARRIAGES.

BAKER—BUCHAN.—On December 7, at Emmanuel Church, Mannamead, Plymouth, by the Rev. E. Berry, M.A., assisted by the Rev. L. Newton, Lieutenant-Colonel William James Baker, R.A.M.C., Arbor Hill, Dublin, third son of William Baker, Esq., of Edgcumbe Tower, Bournemouth, to Evelyn Frances, younger daughter of Colonel H. Philip and Mrs. Buchan, of Lockyer House, Mannamead, Plymouth.

MORGAN—SMALLMAN.—In St. Paul's Cathedral, London, Canada, on November 8, 1905, by the Very Rev. The Dean of Huron, assisted by the Venerable Archdeacon Richardson and the Rev. Canon Dann, Rector of the Cathedral, Captain Claude Kyd Morgan, Royal Army Medical Corps, Cairo, Egypt, to Eleanor, only daughter of T. H. Smallman, Esq., Waverley, London, Canada.

DEATHS.

CROFTON.—On December 3, at his residence, 1, Peafield, Blackrock, Dublin, Captain William Jones Crofton, M.B., retired Army Medical Staff, aged 43. He entered the Service July 27, 1887, and was placed on temporary half-pay April 7, 1892. He retired April 7, 1897.

ROCHE.—On November 26, at Lucknow, India, Captain James Valentine Roche, R.A.M.C., from fracture of skull, the result of a fall, aged 29. He entered the Service, January 29, 1901, and was promoted Captain, January 29, 1904. His war services are as follows: South African War, 1901-2; operations in the Transvaal, November, 1901; operations in Orange River Colony, November, 1901, to May 31, 1902; operations in Cape Colony, October and November, 1901. Queen's medal with five clasps.

WADDELL.—On November 29, at Middelburg, Transvaal, Captain James Waddell, M.B., R.A.M.C., of tubercle of lung, aged 30. He entered the Service June 19, 1901; was placed on temporary half-pay on account of ill-health, March 11, 1904; restored to full pay and promoted Captain, June 23, 1905. His war services are as follows: South African War, 1901-2. Queen's medal with four clasps. He served as a Civil Surgeon in South Africa before entering the Royal Army Medical Corps.

THE ROYAL ARMY MEDICAL CORPS FUND.

The Twenty-First Meeting of the Committee.

The Twenty-First Meeting of the Committee wes held at 68, Victoria Street S.W., on Tuesday, December 5, 1905, at 4 p.m.

Present.

Surgeon-General A. Keogh, C.B., Director-General, A.M.S., Chairman.
Surgeon-General Sir Charles McD. Cuffe, K.C.B. } Representing Retired Officers.
Lieutenant-Colonel A. B. Cottell. }
Surgeon-General W. J. Fawcett, C.B.
Colonel A. T. Sloggett, C.M.G.
Colonel H. E. R. James.
Major H. C. Thurston, C.M.G.

Minutes.—(1) The Minutes of the Twentieth Meeting were confirmed.

(2) The Director-General notified that Lieutenant-Colonel Fairland had asked him to accept his resignation of membership of this Committee, as he found that owing to his many duties elsewhere he was unable to attend the meetings. Lieutenant-Colonel Fairland had been informed by the Director-General that he regretted his inability to continue a member, and that his resignation would be laid before the Committee.

The Committee accepted Lieutenant-Colonel Fairland's resignation with regret.

(3) The Accounts of the Fund for the five months ended November 30, 1905, having been audited and found correct by Colonel James and Lieutenant-Colonel Firth, were approved by the Committee, and are appended to these Minutes.

(4) *Wolseley Memorial.*—The Committee was informed that the engraver who was executing the Memorial Brass to Colonel Wolseley required an additional £3 for the cost of carriage and case, as well as for certain points connected with the engraving, which are in excess of the design on the selected illustration.

The Committee agreed to increase the grant of £20 already voted to £23.

(5) The following donations have been received from the Regimental Institute of the Detachment, Royal Army Medical Corps, Halifax, Canada:—

General Relief Fund	£5 0 0
Widows' and Orphans' Fund	5 0 0

The Committee considered it advisable to again draw the attention of Regimental Institutes to the fact that the General Relief Fund was able to deal with widows and orphans, and to the recommendation that the separate Widows' and Orphans' Fund be allowed to expire. As pointed out at the Second General Meeting there is a disadvantage in having more than one Fund dealing with the same subject (see Journal, August, 1904, Corps News, p. 22).

(6) An attempt to obtain a passage for the wife and children for the non-commissioned officer referred to in Minute 9 of the Twentieth Meeting having failed, the sum of £16 18s. 3d. has been paid from the General Relief Fund towards obtaining passages for them to South Africa.

(7) Colonel James presented three more "V.C." pictures which had been recently completed. These received the unanimous approbation of the Committee.

B. SKINNER, *Lieutenant-Colonel,*
Hon. Secretary.

December 6, 1905.

ROYAL ARMY MEDICAL CORPS FUND. ACCOUNT FOR FIVE MONTHS ENDED NOVEMBER 30, 1905.

GENERAL FUND APPROPRIATIONS.

RECEIPTS.	£ s. d.	£ s. d.	DISBURSEMENTS.	£ s. d.	£ s. d.
Subscriptions. Active List :—			Stamps	1 3 6	
2 Officers at £2*	4 0 0		Clerks	1 9 6	
1 Officer at £1 1s.	1 1 0		Printing	1 13 4	
9 Officers at £1	9 0 0		Stationery	1 3 3	
		14 1 0			5 9 7
Retired Pay :—			Balance allocated as follows :—		
1 Officer at £1	1 0 0	1 0 0	Memorial Fund	4 15 9	
			Dinner Fund	2 7 10	
			Band Fund	2 7 10	
					9 11 5
		£15 1 0			£15 1 0

* Subscriptions for 1904 and 1905.

MEMORIAL FUND.

Receipts.		£ s. d.	Disbursements.		£ s. d.
Balance credit brought forward from June 30, 1905—			Endowment of Second Room in Union Jack Club ..		100 0 0
On Deposit	£700 0 0		Expenses connected with painting six pictures for the "V.C." Gallery		94 10 0
Current Account	276 12 1	976 12 1	Paymaster-General, Account of de Chaumont Trust Deed		9 0 8
Grant from General Fund		4 15 9	South Africa Memorial Fund to balance Account ..		31 19 8
			Framing six "V.C." pictures		2 17 6
			Balance in hand (see Balance Sheet)—		
			Deposit	£600 0 0	
			Current Account	143 0 0	743 0 0
		£981 7 10			£981 7 10

November 3, £100 withdrawn from deposit.

BAND FUND.

Receipts.	£ s. d.	Disbursements.	£ s. d.
Balance Credit brought forward from June 30, 1905 ..	170 19 8½	To Major Hinge for Band	135 0 0
Grant from General Fund	2 7 10	Balance Current Account (see Balance Sheet)	38 7 6½
	£173 7 6½		£173 7 6½

DINNER FUND.

Receipts.	£	s.	d.	Disbursements.	£	s.	d.
Balance Credit brought forward from June 30, 1905 ..	95	0	6½	Balance of Payments for Annual Dinner, 1905 ..	6	5	8
Grant from General Fund	2	7	10	R.A.M.C. Band for performance at Annual Dinner, 1905	5	0	6
				Balance, Current Account (see Balance Sheet)	86	2	2½
	£97	8	4½		£97	8	4½

COMPASSIONATE FUND (Charitable Schools).

Receipts.	£	s.	d.	Disbursements.	£	s.	d.
Balance Credit brought forward from June 30, 1905—				Northants Orphanage, two quarters' payments, from July 1, 1905, Girls (2), H.	16	0	0
On Deposit £1,314 0 2				St. Vincent de Paul Male Orphanage, Glasnevin, six months' maintenance, from July 6, 1905, Boy, R...	8	10	0
Current Account 43 16 4	1,357	16	6	Royal Soldiers' Daughters' Home, Hampstead, one year's Pension and Railway Expenses, from July 4, 1905, Girl, E.C.	20	0	0
				Balance in hand (see Balance Sheet)—			
				Deposit £1,264 0 2			
				Current Account 49 6 4	1,313	6	6
	£1,357	16	6		£1,357	16	6

November 3, 1905, £50 withdrawn from deposit.

COMPASSIONATE FUND (General Relief).

Receipts.		£ s. d.	Disbursements.		£ s. d.
Balance Credit brought forward from June 30, 1905—			To Aldershot Sub-Committee for General Relief ..		20 0 0
On Deposit	£900 0 0		Balance in hand (see Balance Sheet)—		
Current Account	235 14 9		Deposit	£900 0 0	
		1,135 14 9	Current Account	225 14 9	
From Regimental Institute, Valetta, Malta		5 0 0			1,125 14 9
,, ,, ,, Canada		5 0 0			
		£1,145 14 9			£1,145 14 9

COMPASSIONATE FUND (Widows and Orphans).

Receipts.		£ s. d.	Disbursements.		£ s. d.
Balance Credit brought forward from June 30, 1905—			Balance in hand (see Balance Sheet)—		
On Deposit	£400 0 0		Deposit	£400 0 0	
Current Account	27 5 5		Current Account	32 5 5	
		427 5 5			432 5 5
From Regimental Institute, Canada		5 0 0			
		£432 5 5			£432 5 5

BALANCE SHEET.

ASSETS.

	£	s.	d.	£	s.	d.	£	s.	d.
Cash at Bankers, Current Account—									
Balance from June 30, 1905	849	2	9						
Total Receipts as per Bankers' Pass Book, including £150 withdrawn from deposit	180	1	0						
				1,029	3	9			
Total Expenditure as per Bankers' Pass Book				456	4	0			
Balance at Bankers				572	19	9			
,, Cash in hands of Hon. Sec.				1	16	6			
							574	16	3
Deposit Account—									
Charitable Schools				1,264	0	2			
General Fund—Memorials, £600; General Relief, £900; Widows and Orphans, £400				1,900	0	0			
							3,164	0	2
							£3,738	16	5

December 2, 1905.

LIABILITIES.

	£	s.	d.
To Memorial Fund	743	0	0½
,, Band Fund	38	7	6½
,, Dinner Fund	86	2	2
,, Compassionate Fund (Charitable Schools)	1,313	6	6
,, ,, ,, (General Relief)	1,125	14	9
,, ,, ,, (Widows and Orphans)	432	5	5
	£3,738	16	5

(*Signed*) B. SKINNER, *Lieutenant-Colonel, R.A.M.C.*
Hon. Secretary.

We have this day inspected the Accounts produced by the Honorary Secretary and Treasurer of the Fund, and verified the Balance Sheet. We find that there stood, on November 30, 1905, to the Credit of the Fund, the sum of £3,738 16s. 5d. (Three thousand, seven hundred and thirty-eight pounds, sixteen shillings and five pence), which sum exists as £3,164 0s. 2d., on deposit account, and £574 16s. 3d. as Cash Balance either in hands of Honorary Treasurer or as credit current account at Bankers. We have checked the vouchers and receipts, and inspected the Current Account, and find them correct, inspected the cheque and bank books, and are satisfied that the accounts are correct.

December 4, 1905.

H. E. R. JAMES, *Colonel.*
R. H. FIRTH, *Lieutenant-Colonel.*

NOTICE TO SUBSCRIBERS.

OFFICERS are particularly requested to give timely notice of changes of station or changes of address, in order to ensure the posting of the Journal to its correct destination.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, &c. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts and commands at home and abroad. All these communications should be written upon one side of the paper only, they should by preference be typewritten, but, if not, all proper names should be written in capital letters (or printed) to avoid mistakes, and be addressed to the Editor, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, 68, Victoria Street, London, S.W.

Letters regarding subscriptions, non-delivery of the Journal, or change of address, should be sent to Major T. McCulloch, R.A.M.C., 68, Victoria Street, London, S.W.

Communications have been received from Lieutenant-Colonels G. Coutts, W. G. A. Bedford, C.M.G., J. E. Nicholson (R.P.); Majors T. DuB. Whaite, P. Fowler; Captains J. W. H. Houghton, S. M. Adye-Curran, W. A. Ward, M. C. Beatty, E. D. W. Greig, I.M.S.; Dr. G. A. Ballingall, Dr. J. A. Mitchell.

In the event of reprints of articles being required by the authors, notification of such must be sent when submitting the papers. Reprints may be obtained at the following rates, and other reprints at proportionate rates:—

		s.	*d.*		*s.*	*d.*		*s.*	*d.*
12 Copies of 4 pp.		3	6						
25	,, ,,	4	6	Of 8 pp.	7	6	Extra for covers	4	0
50	,, ,,	5	6	,,	9	0	,,	5	0
100	,, ,,	7	6	,,	12	6	,,	6	6
200	,, ,,	11	6	,,	19	0	,,	9	0

CASES FOR BINDING VOLUMES.—Strong and useful cases for binding can be obtained from the publishers at the undermentioned rates:—

Covers, 1*s.* 4*d.* net; binding, 1*s.* 2*d.*

These charges are exclusive of cost of Postage.

In forwarding parts for binding the name and address of sender should be enclosed in parcel.

The following periodicals have been received: *The Medical Record, The Medical News, New York Medical Journal, American Medicine, Gazette Med. de Paris, Archives de Medicine et de Pharmacie Militaires, Il Morgagni, Gazetta Medico-Italiana, The Medical Review, El Siglo Medico, Der Militärärzt, Deutsche Militärärztliche Zeitschrift, Anales de Sanidad Militar, Revue Med. de la Suisse Romande, La Medicina Militar Espanola, The Boston Medical and Surgical Journal, Annali di Med. Navale, Giornale del Regio Esercito, Le Caducée, The Hospital, The Ophthalmoscope, St. Thomas's Hospital Gazette, Bulletin de l'Acad. de Med. de Paris, Arch. Med. Belges, Voyenno Medisinskii, The Indian Medical Gazette, The Australasian Medical Gazette, Journal of the Association of Military Surgeons, U.S., Militärlagen ungwet af Militärlaegeforeningen, i Kjobenharn, The Veterinary Journal, The Practitioner, Public Health, Medical Review, The Army and Navy Gazette, The United Service Gazette, Journal of the Royal United Service Institution, The Johns Hopkins Press, The Health Resort and Journal of Spas and Sanatoria, Journal of the Royal Sanitary Institute, Journal of the U.S. Institution of India, Indian Public Health, Bulletin de l'Institut Pasteur, Records of the School of Medicine, Cairo.*

We desire to remind members who have not paid their second year's subscription, which was due on July 1, 1904, that it is very important that such should be promptly paid.

NOTICE.

The Corps News is now printed as an inset to the Journal and separate copies may be subscribed for, price 2d. monthly.

JOURNAL

OF THE

ROYAL ARMY MEDICAL CORPS.

Corps News.

February, 1906.

ROYAL ARMY MEDICAL STAFF. GAZETTE NOTIFICATIONS.

Surgeon-General James A. Clery, C.B., M.B., is placed on temporary half-pay on account of ill-health, dated December 29, 1905.

Colonel William B. Slaughter, from the Royal Army Medical Corps, to be Surgeon-General, vice W. F. Burnett, retired, dated June 21, 1905.

Colonel William S. Pratt, M.B., from the Royal Army Medical Corps, to be Surgeon-General, vice J. A. Clery, C.B., M.B., placed on temporary half-pay, dated December 29, 1905.

ROYAL ARMY MEDICAL CORPS.

Colonel Alexander W. Duke, M.D., is placed on retired pay, dated December 18, 1905. He entered the Service October 1, 1868, was promoted Surgeon March 1, 1873; Surgeon-Major October 1, 1880; Surgeon-Lieutenant-Colonel October 1, 1888; Brigade Surgeon-Lieutenant-Colonel September 8, 1894; and Colonel December 1, 1898. His war services are as follows: South African War, 1899-1900. In command of General Hospital and as Principal Medical Officer of a portion of the Lines of Communication. Operations in Cape Colony, 1899-1900. Operations in Orange River Colony and Transvaal, 1900. Queen's medal with 3 clasps.

Lieutenant-Colonel Brisbane W. Somerville-Large, F.R.C.S.Edin., retires on retired pay, dated December 20, 1905. He entered the Service February 4, 1877; was promoted Surgeon-Major February 4, 1889; Surgeon-Lieutenant-Colonel February 4, 1897; and Lieutenant-Colonel, with higher rate of pay, August 2, 1899. His war services are as follows: South African War, 1899-1902. Principal Medical Officer No. 6 General Hospital, January 7, 1900, to November, 1901, and of No. 12 General Hospital, November, 1901, to May 31, 1902. Operations in the Transvaal, August to November 29, 1900. Operations in Orange River Colony, July to August, 1900. Operations in Cape Colony, January to July, 1900. Operations in the Transvaal, November 30, 1900, to November, 1901. Operations in Orange River Colony, November, 1901, to May 31, 1902. Queen's medal with three clasps. King's medal with two clasps.

Captain James E. Carter, M.B., to be Major, dated December 2, 1905.

Lieutenant Ryder P. Nash resigns his Commission, dated January 6, 1906. He entered the Service January 31, 1905.

Lieutenant Arthur J. Arch resigns his Commission, dated January 10, 1906. He entered the Service July 31, 1905.

The undermentioned Lieutenant-Colonels to be Colonels: Charles Seymour, M.B., *vice* W. B. Slaughter, promoted, dated June 21, 1905. George W. Robinson, *vice* C. Seymour, M.B., seconded. Arthur W. P. Inman, M.B., *vice* W. E. Webb, M.D., retired, dated July 22, 1905. Thomas M. Corker, M.D., *vice* G. A. Hughes, D.S.O., M.B., retired, dated August 26, 1905. Charles A. Webb, *vice* C. H. Swayne, D.S.O., retired, dated September 18, 1905. Henry Martin, M.B., *vice* A. W. Duke, M.D., retired, dated December 18, 1905. Arthur E. J. Croly, F.R.C.S.I., *vice* W. S. Pratt, promoted, dated December 29, 1905.

The undermentioned Lieutenants from the seconded list to be Lieutenants: Cecil J. Wyatt, M.B., dated January 1, 1906. Robertson S. Smyth, dated January 2, 1906.

Royal Hospital, Chelsea.—Colonel Charles Seymour, M.B., R.A.M.C., to retain his appointment on promotion, dated June 21, 1905.

ARRIVALS HOME.—From India: Lieutenant-Colonel C. W. Johnson; Major J. Hennessey; Captains W. L. Baker, G. Carroll, M. P. Corkery, B. R. Dinnis and F. M. Parry. From China: Lieutenant-Colonel W. G. Macpherson, C.M.G. From Jamaica: Major E. M. Hassard and Captain T. E. Fielding. From West Africa: Major G. S. McLoughlin, D.S.O., and Captain H. W. Grattan. From Malta: Captain A. D. Jameson. From Canada: Lieutenant-Colonel H. W. Murray.

ARRIVAL HOME ON LEAVE.—From Malta: Major C. E. Pollock.

EMBARKATIONS.—For India: Lieutenant-Colonels A. E. Morris, C. W. Thiele and T. B. Winter; Major E. Eckersley; Captain A. H. Waring; Lieutenants R. H. L. Cordner, R. E. Humfrey, G. Ormrod, C. W. O'Brien, W. Parsons and G. G. Tabuteau. For South Africa: Major W. E. Hardy and Lieutenant E. G. R. Lithgow.

POSTINGS.—Lieutenant-Colonel H. W. Murray to Shorncliffe. Lieutenant-Colonel C. W. Johnson, Major E. M. Hassard, Captains A. D. Jameson and H. G. F. Stallard to Eastern Command. Captains M. P. Corkery and T. E. Fielding to Southern Command. Major J. Hennessy and Captain G. Carroll to Irish Command. Captain W. L. Baker to Aldershot. Captain F. M. Parry to Jersey.

Distribution of Captains, R.A.M.C., on completion of Course of Instruction at Royal Army Medical College:—

Captains J. M. Sloan and R. H. Lloyd, to Scottish Command. Captains R. L. Argles and A. C. Chopping, to Northern Command. Captains W. P. Gwynn and J. W Leake to Welsh and Midland Command. Captain T. C. Mackenzie, D.S.O., to Aldershot (Depôt). Captains F. J. Fitzgerald, H. K. Palmer, F. W. Hardy, J. Matthews, B. F. Wingate, S. G. Butler, B. Watts, R. Selby, and R. E. G. Phillips to Eastern Command. Captains H. D. Packer, P. S. Lelean, and H. J. McGrigor to Southern Command. Captains E. W. Powell and G. J. A. Ormsby to Irish Command. Captain J. G. Gill to Netley.

Distribution of Lieutenants, R.A.M.C., on completion of Course of Instruction at Aldershot:—

Lieutenants J. M. B. Rahilly, G. E. Ferguson, T. Scatchard, R. A. Bryden, G. H. Rees, W. J. Weston, M. J. Cromie, W. C. Nimmo, E. T. Potts, A. D. O'Carroll, H. E. Priestley, A. C. Vidal, and P. J. Marett, to Aldershot Army Corps. Lieutenants H. St. M. Carter, G. E. W. S. Fawcett, A. E. S. Irvine, T. B. Moriarty, A. E. F. Hastings, G. W. W. Ware, F. C. Sampson, C. F. White, M. Keane, T. S. Blackwell, and H. Stewart to Curragh, Ireland. Lieutenants W. Byam, G. W. Heron, J. A. Anderson, H. G. Sherren, H. H. A. Emerson and W. Benson, to London. Lieutenants R. P. Lewis, J. H. Graham, A. M. Rose, E. L. Moss, E. G. Anthonisz, V. H. Symons, M. B. H. Ritchie, J. S. Dunne, and W. McConaghy, to Netley.

EXCHANGES.—Lieutenant-Colonels R. Caldwell and W. L. Reade. Majors E. C. Anderson, D.S.O., and G. S. Crawford.

TRANSFERS.—Lieutenant-Colonel F. B. Maclean, from Eastern Command to Jersey. Major T. H. F. Clarkson, from Jersey to the Tower of London.

Lieutenant-Colonel and Honorary Colonel Sir J. R. A. Clark, Bt., C.B., has been granted an extension of five years in his appointment as Officer Commanding Royal Army Medical Corps Militia.

Captain L. F. Smith has passed the Examination for D.P.H., University of Dublin.

QUARTERMASTERS.

The orders for Lieutenant and Quartermaster T. J. Jacomb to proceed to South Africa have been cancelled.

Captain and Quartermaster D. Dallus has retired. Captain and Quartermaster E. Thowless has been granted the honorary rank of Major, from December 24, 1905.

LIST OF CASUALTIES:—

Tranfers from Other Corps.—Private W. Jenkins from Royal Field Artillery.

Transfers to Other Corps.—9277 Staff-Sergeant C. E. Smith, to London Company Royal Army Medical Corps Militia, as instructor; 9977 Lance-Sergeant N. Walden,

to Lichfield Company Royal Army Medical Corps Militia, as instructor; 10107 Corporal C. Freeman, to 2nd Company, Devonport Royal Army Medical Corps Militia, as instructor; 10831 Corporal H. W. G. Gregory, to York Company Royal Army Medical Corps Militia, as instructor; 17760 Private H. Gully, to Royal West Kent Regiment; 19915 Private A. F. Bruton, to Royal Engineers; 19911 Private A. A. Pearce, to 8th Hussars; 19874 Private W. S. Osmond, to Royal Field Artillery.

Transfers to Army Reserve.—18148 Private G. H. Mortlock, 18151 Private G. E. Sole, 17042 Private D. Miller, 18954 Private F. Stanley, 16923 Private J. Chesters, 15937 Private E. N. Hobday, 17322 Private M. J. Boland, 18175 Private T. Keellcher, 16450 Private W. Spiers, 18166 Private H. Beech, 12206 Private H. D. Palmer, 18180 Private A. W. Soms, 18189 Private A. Wass, 11599 Private H. Palmer, 11658 Private W. J. Mesey, 18190 Private H. W. Bull, 18204 Private A. Faulkner, 18223 Private E. Jones, 18287 Private T. Keenan, 18217 Private P. Tyler, 18208 Private W. J. H. Hodgskin, 18197 Private F. Goode, 13926 Private H. Gould.

Discharges.—7236 Sergeant-Major C. B. Thompson, termination of engagement; 6962 Quartermaster-Sergeant J. T. Fry, after eighteen years; 6353 Sergeant T. D. Cameron, termination second period; 14689 Corporal J. Bloor, termination of engagement, A.O. 106; 14020 Private W. J. Anderson, medically unfit; 19250 Private S. C. Tuck, medically unfit; 18442 Private W. Muzzell, medically unfit; 16858 Private S. Furniss, termination of engagement, A.O. 106; 16958 Private C. Ellingworth, termination of engagement, A.O. 106; 19213 Private F. T. Morton, medically unfit.

Disembarkations from Abroad.—Malta to England, per s.s. "Borneo": 8472 Staff-Sergeant F. Oliver.

Malta to England, per s.s. "Maine": 17053 Private D. Powell, 17162 Private T. Rogers.

Halifax, Nova Scotia, to England, on withdrawal of troops, &c., per s.s. "Virginia": 7848 Quartermaster-Sergeant W. Henfrey, 16482 Private W. Leppington.

Barbados to England, per s.s. "La Plata," on reduction of establishment: 17745 Private H. Bailey, 16137 Private G. T. Beswick, 18490 Private H. Cooper, 16153 Private S. Lyon, 18063 Private F. Welch.

Sierra Leone to England, per s.s. "Burnton," tour expired: 10892 Sergeant H. J. Reeve.

Jamaica to England, per s.s. "Zaria," tour expired; 9095 Staff-Sergeant H. H. Taylor, 18501 Private J. Cannell, 18274 Private W. R. Nixon.

Barbados to England, per s.s. "Zaria," reduction of establishment: 18813 Private W. Gaffney, 18588 Private R. Moreland, 18113 Private F. J. Shaw.

Moves Abroad.—From Singapore to Tientsin, North China: 16148 Private W. Andrews.

Embarkations for Abroad.—To Singapore: 6891 Sergeant-Major A. Fowler.

To Ceylon per s.s. "Orotava": 7379 Sergeant-Major C. H. Cooper.

To Sierra Leone per s.s. "Kasina": 8730 Staff-Sergeant W. C. Andus.

England to Mauritius per s.s. "Dilwara" for tour of duty: 11146 Sergeant E. Wing, 11761 Sergeant F. Watts, 8657 Lance-Sergeant H. Skeet, 11665 Corporal H. W. Millar, 11649 Corporal J. H. Mustill, 11211 Corporal L. T. Marsden, 18658 Private E. R. Gardner, 18734 Private S. Wilson, 18865 Private J. Ward, 18582 Private J. T. Vince, 18438 Private L. Boyes, 15714 Private J. Harwarden, 17275 Private G. H. Wheeler, 19165 Private A. C. Faith, 18096 Private F. Heedy, 17400 Private P. Sarsfield, 18014 Private B. J. Yate.

England to South Africa per s.s. "Dilwara": 16095 Private W. Groom, 18257 Private J. Percy, 18229 Private J. Turbyne, 9757 Private C. Hayes, 19358 Private E. J. James, 18722 Private D. J. J. Leach, 19341 Private F. A. Smith, 19447 Private H. G. Beckley, 19340 Private E. J. Warman.

Examinations.

The following have qualified for promotion, &c.:—

For Sergeant-Major.—5372 Sergeant-Major A. C. Wren.

For Sergeant.—10126 Sergeant J. Hedley, 16473 Lance-Sergeant W. George, 9552 Lance-Sergeant L. Mills.

For Corporal.—12554 Private G. Hart, 14435 Private W. Boyd, 14729 Private W. H. Dawtrey, 17767 Private J. Harris, 16756 Private N. W. Brown, 17057 Private M. Ward, 18496 Private W. Emery, 18270 Private J. Yates, 17543 Private F. A. Dawes, 15591 Private J. Harris, 16523 Private T. H. Carsberg, 16847 Private E. R. Benn, 18222 Private A. Dady, 18970 Private J. Higginbottom.

EXTRACTS FROM CORPS ORDERS, DATED JANUARY 1, 1906.

Extract from a despatch from Lieutenant-General Sir C. C. Egerton, K.C.B., D.S.O., Commanding Somaliland Field Force:—

"HEADQUARTERS, BERBERA, MAY 30, 1904.

"I append a list of officers and others whom I desire to recommend for special consideration for their services during the campaign, and a second list of those whose good work I desire to bring to notice.

"LIST I. .. ..

"LIST II.—Officers:— .. Warrant officers, non-commissioned officers, and men:—No. 14008 Corporal D. Watt, R.A.M.C., Ambulance Corps."

Royal Humane Society.—The Testimonial on Vellum has been awarded to the undermentioned warrant officer for saving a boy from drowning at Chester, on September 3, 1905:—No. 7782 Sergeant-Major T. E. McColgin.

Queen Alexandra's Imperial Military Nursing Service.—Her Majesty the Queen has been graciously pleased to approve of the undermentioned man being permitted to retain the badge of Q.A.I.M.N.S. on his discharge, in recognition of his meritorious service:—No. 7228 Private W. Slater.

Promotions.—The following promotions, to complete establishment, will take effect from the dates specified:—

To be Sergeant-Majors.

No.	Rank and Name		Date of Casualty	Remarks
6783	Qr.Mr.-Sergt.	Taylor, W. H.	27.11.05	*Vice* Feaver, discharged.
7561	,,	Godman, J. F. E. ..	18.12.05	*Vice* Thompson, discharged.

To be Quartermaster-Sergeants.

6622	Staff-Sergeant	Ross, E.	1.1.06	
8503	,,	Driver, J. L.		
8284	,,	Southwood, J.		
8299	,,	Bowen, E. C.		

To be Sergeants.

6859	Lance-Sergeant	Walsh, J.	1.1.06	Special as Clerk.
7474	,,	Huxtable, L.		,, ,,
7415	,,	Barrett, W.		,, Suptg. Cook.
8516	,,	Harrington, G. S. ..		,, ,, ,,
10029	,,	Barrett, F. B.		,, Clerk.
9552	,,	Mills, L.		Nursing Section.
12504	,,	Shepherd, E.		,,
10736	,,	Gray, G. E.		,,
10762	,,	Edwards, C. H.		,,
12410	,,	Coombs, R. B.		,,
14602	,,	Hughes, J.		,,
11089	,,	Flint, F. S.		,,
12510	,,	Redwood, F. J.		,,
13027	,,	Cantrell, J. B.		,,
14631	,,	Breen, A.		,,
16473	,,	George, W.		,,
17229	,,	Hutchens, W.		,,
18662	,,	Hepburn, A.		,,

To be Corporals.

8250	Lance-Corporal	Sandfield, G.		Special as Cook.
8501	,,	Taylor, J. A. C... ..		,, ,,
15980	,,	Anderton, A. G. ..		Nursing Section.
15996	,,	Griffin, W. H.		,, ,,
12248	,,	Gamblen, W.		Cooking ,,
11628	,,	Fullam, T. A.		,, ,,
16810	,,	Miller, M. P.		General Duty Section.
8770	,,	Wilson, R.		,, ,,
10458	,,	Langston, W.		Nursing ,,
11405	,,	Scott, W.		Cooking ,,
12052	,,	Halkett, F. C.		Clerical ,,
12154	,,	Powell, L. A.		General Duty ,,
12158	,,	Strange, E. J.		Nursing ,,
12264	,,	Delamare, W. G. ..		General Duty ,,
12340	,,	Butler, T.		Nursing ,,
17650	,,	Hendrie, A. J. C. ..		Clerical ,,
12589	,,	Harris, A.		Nursing ,,
12660	,,	Hemsley, E.		,, ,,
12944	,,	Jackson, C.		General Duty ,,
13025	,,	Bovey, F. C.		Q.A.I.M.N.S.
13187	,,	Sparks, F.		Cooking Section.
14050	,,	Andrews, W.		General Duty Section.
14082	,,	Prince, G.		Nursing ,,
18973	,,	Abbott, J. J.		,, ,,
15018	,,	Davis, A. J.		Clerical ,,
15196	,,	Pepper, C. T.		Nursing ,,
15238	,,	Wrigglesworth, J. T. ..		Clerical ,,
15389	,,	Dunn, G.		Nursing ,,
15786	,,	Collins, H. E. C. ..		Clerical ,,
15957	,,	Wildish, I. W.		Nursing ,,
15967	,,	Tringham, W. T. ..	1.1.06	Clerical ,,
15983	,,	Lister, C. E.		Nursing ,,
16053	,,	Gawthorne, S. M. ..		,, ,,
16048	,,	Taylor, W. J.		,, ,,
16178	,,	Macauley, T. J... ..		General Duty ,,
16259	,,	Thomson, W.		Clerical ,,
16231	,,	Mason, H. B.		General Duty ,,
16289	,,	Hearn, C. G.		,, ,,
16304	,,	Langley, A.		Clerical ,,
17005	,,	Turner, J. H.		General Duty ,,
17058	,,	Fayter, H.		,, ,,
17151	,,	Brown, J. T.		Clerical ,,
17182	,,	Royals, S.		General Duty ,,
17260	,,	Payne, G. W.		,, ,,
17316	,,	Batterham, E. J. ..		Clerical ,,
17427	,,	Higgins, L.		Nursing ,,
17485	,,	Kennedy, H.		,, ,,
17922	,,	Mackenzie, R. J. ..		General Duty ,,
17973	,,	Knott, F.		Clerical ,,
19046	,,	Phillips, S. J.		Nursing ,,
18032	,,	Burns, J. I.		Clerical ,,
18122	,,	Kirby, J. A.		,, ,,
18239	,,	Roland, R. F.		Nursing ,,
18415	,,	Bell, A.		,, ,,
18453	,,	Philbrook, F. A. ..		,, ,,
18463	,,	Day, F. W.		,, ,,
18678	,,	Ellis, L. S.		,, ,,
18718	,,	Parr, W. H.		,, ,,
18926	,,	Worrad, W.		,, ,,
18940	,,	Musgrave, P. H. ..		,, ,,
18985	,,	Shaw, S...		,, ,,

Appointments.—The following appointments to Lance Rank wil. take effect from the date specified :—

To be Lance-Sergeants, as Compounders of Medicine.

No.	Rank and Name		Date of Casualty	Remarks
11528	Corporal	Bannister, J.		Nursing Section.
10830	,,	Davidson, A.		,,
13666	,,	Hughes, W. C.		,,
12270	,,	Simmons, J.		,,
12743	,,	Wilson, T. R.		,,
15808	,,	Primer, C.		,,
9405	,,	Valance, C.		,,
17933	,,	Dean, D. E.		,,
11952	,,	Malley, A. E.		,,
17568	,,	Steele, E.	1.1.06	,,
18713	,,	Ellis, W. H.		,,
17843	,,	Blair, R. C.		,,
17500	,,	White, R. R.		,,
10442	,,	Dunglison, C.		,,
16751	,,	Leighton, J.		,,
18307	,,	Barker, F. H.		,,
17644	,,	Hart, H. E.		,,
17759	,,	Black, J...		,,
18233	,,	Evans, D. C.		,,
18439	,,	Leach, W. T.		,,

To be Lance-Corporals.

8990	Private	Field, H. H.		Cooking Section.
9538	,,	Keating, J.		Nursing ,,
9539	,,	Milborne, A. E... ..		,, ,,
10118	,,	Tapping, G.		General Duty Section.
15776	,,	Blackman, H. G. ..		,, ,,
18939	,,	French, J. E.		,, ,,
10766	,,	Osborne, D.		,, ,,
10926	,,	Dover, E.		Cooking ,,
11117	,,	Griffiths, W.		Nursing ,,
11276	,,	Darker, J. G.		Cooking ,,
11402	,,	Stokes, E.		Nursing ,,
11743	,,	Mingley, G.		General Duty ,,
11789	,,	Skinner, W.		Nursing ,,
11814	,,	Herington, A. E. ..		General Duty ,,
11908	,,	Prior, A.		Nursing ,,
12002	,,	Knee, W. J.		,, ,,
18970	,,	Higginbottom, J. ..	1.1.06.	Clerical ,,
12342	,,	Le Page, L.		General Duty ,,
12506	,,	O'Rourke, P. J... ..		Nursing ,,
12554	,,	Hart, G...		Cooking ,,
12617	,,	Edwards, J. R.		General Duty ,,
17022	,,	Weaver, A. R.		,, ,,
13773	,,	Bower, G. F.		Cooking ,,
13814	,,	Kenneally, P.		Nursing ,,
17543	,,	Dawes, F. A.		General Duty ,,
14512	,,	Widdall, J.		Nursing ,,
14538	,,	Wells, H.		General Duty ,,
14668	,,	Ansden, A.		Nursing ,,
14729	,,	Dawtry, W. H.		,, ,,
15291	,,	Goodman, J. M. ..		,, ,,
15288	,,	Prince, W. C.		Clerical ,,
15591	,,	Harris, J.		,, ,,

No.	Rank and Name		Date of Casualty	Remarks
15671	Private	Cole, R. W.		General Duty Section
15813	,,	Heggie, A. V.		,, ,,
16002	,,	Amsden, H. W... ..		Nursing ,,
16022	,,	Dawson, J. J.		Clerical ,,
16134	,,	Bransgrove, W. J. ..		General Duty ,,
16319	,,	Burnett, G.		Clerical ,,
16523	,,	Carsberg, T. A... ..		,, ,,
16756	,,	Brown, N. W.		Nursing ,,
16847	,,	Benn, E. R.		Cooking ,,
16956	,,	Powney, H. H... ..		Nursing ,,
17057	,,	Ward, M.		,, ,,
17102	,,	Harvey, D.		General Duty ,,
17180	,,	Norwood, E. A... ..		Cooking ,,
17210	,,	James, C. E.		General Duty ,,
17303	,,	Auchterlonie, A. ..		Q.A.I.M.N.S.
17380	,,	Haigh, J. W. D. ..		General Duty ,,
17409	,,	Kimberley, H.		Cooking ,,
17632	,,	Lunn, H. C. A... ..		Nursing ,,
17691	,,	Shearon, A.		,, ,,
17776	,,	Milliken, W.	1.1.06	General Duty ,,
17730	,,	Wills, P...		,, ,,
17834	,,	Harman, F.		,, ,,
17842	,,	Ainsworth, E.		Nursing ,,
17926	,,	Winter, J. F.		General Duty ,,
17987	,,	Betts, A...		Cooking ,,
18110	,,	Gibson, R. W.		General Duty ,,
18170	,,	Sufrin, L.		,, ,,
18192	,,	Harlen, M.		Nursing ,,
18213	,,	Pacey, W. C.		,, ,,
18222	,,	Dady, A.		General Duty ,,
18240	,,	Johnson, W. B. T. ..		,, ,,
18270	,,	Yates, J...		Nursing ,,
18496	,,	Emery, W.		Clerical ,,
18569	,,	Colbert, C.		Nursing ,,
18577	,,	Read, F. L.		,, ,,
18728	,,	Cole, F. R.		,, ,,
18932	,,	Milton, D.		General Duty ,,
18890	,,	Moore, J.		Clerical ,,
18969	,,	Gray, E...		Nursing ,,
19000	,,	Ahern, D.		General Duty ,,

Queen Alexandra's Imperial Military Nursing Service.—The undermentioned non-commissioned officers and men have been selected for admission into Q.A.I.M.N.S. in accordance with paragraph 3 of Army Order 87 of 1904, with increased additional pay at sixpence (6d. a day) from the dates specified against their names :—

No.	Rank and Name		Date of Appointment	Station
9514	Private	Billington, H. T. R. ..		Woolwich.
13440	,,	Bloxham, J. T... ..	19.10.05	Dublin.
11283	,,	Irwin, J...		York.
14172	,,	Livermore, E. W. ..		South Africa.
8269	Serjeant	Gibbs, G. A.		Parkhurst.
[1] 13025	Lance-Corporal	Bovey, F. C.	1.12.05	South Africa.
12053	Private	Ross, W.		Gravesend.

[1] Now Corporal.

Nursing Section.—The undermentioned non-commissioned officers and men have been appointed to the Nursing Section of the Corps, from the dates specified against their names:—

No.	Rank and Name		Date of Appointment	No.	Rank and Name		Date of Appointment
18444	Private	Hall, A. H. ..		18634	Lce.-Cpl.	Galton, F. H...	1.11.05
19260	,,	Barker, E. ..		19517	Private	Harrison, R. G.	
19270	,,	Rhodes, J. W...		[1] 17691	,,	Shearon, A. ..	
19290	,,	Horlock, A. E..		19163	,,	Barnes, C. ..	
19320	,,	Ritchie, H. A...		19429	,,	Orton, R. ..	
19334	,,	Howard, W. ..		19463	,,	Miller, G. ..	3.11.05
19370	,,	Potter, T. H. ..	1.10.05	19481	,,	Mills, A. W. V.	
19401	,,	Harland, A. E.		19538	,,	Rogers, A. ..	
19406	,,	Moore, F. ..		19684	,,	Davis, G. S. ..	
19444	,,	Jones, H. A. ..		19862	,,	Tole, L. R. ..	8.11.05
19449	,,	Charles, W. ..		19461	,,	Brown, E.E. ..	9.11.05
19480	,,	Hughes, W. R.		17972	,,	Burgess, G. ..	
19510	,,	Caulfield, H. S.		18513	,,	Holland, A. ..	11.11.05
17714	,,	Robinson, A. R.		19003	,,	Hamilton, A. ..	
17757	,,	Woods, A. C. ..	16.10.05	16947	,,	Cowdery, W. E.	
18509	,,	McFarland, J...		19506	,,	Thorn, C. L. ..	14.11.05
17657	,,	Inns, E. G. ..		19558	,,	Lythgoe, T. ..	
[1] 17842	,,	Ainsworth, E...		12897	,,	Challis, W. ..	20.11.05
19419	,,	Clark, W. G. W.		19508	,,	Fenton, E. ..	27.11.05
19432	,,	Parker, W. T...	21.10.05	18098	,,	Ellis, T. G. ..	
19485	,,	Gibbs, A. ..		19252	,,	Maton, E. M...	1.12.05
19522	,,	Easton, J. ..		19533	,,	Newman, E. P.	
19543	,,	Audus, F. E. H.		19549	,,	Chambers, A. H.	
17421	,,	Plume, P. ..	24.10.05	19863	,,	Mattison, W. H.	6.12.05
18209	,,	Taylor, C. A. ..	30.10.05	12951	,,	Wilkinson, J...	7.12.05
9478	Corporal	Shinner, W. C.	1.11.05	15093	,,	Harris, G. H. ..	9.12.05

[1] Now Lance-Corporals.

The undermentioned non-commissioned officers have qualified for the Nursing Section of the Corps from the dates specified against their names:—

No.	Rank and Name		Date of Casualty	Remarks
18432	Lance-Corporal	Pearce, G. F.	1.10.05	Clerical Section.
18391	,,	Turner, E. C.	7.10.05	,, ,,

Amendments.—Corps Orders (Dated October 2, 1905). The position of the undermentioned non-commissioned officer as regards seniority should be as under, and not as therein stated:—No. 12487 Lance-Corporal C. Halliday with seniority next below No. 11246 Lance-Corporal J. W. Gross.

Promotions.—The undermentioned non-commissioned officers to be Sergeants from the dates specified against their names, on appointment as Instructors to the Auxiliary Forces, in accordance with paragraph 1863, King's Regulations:—

No.	Rank and Name		Date of Casualty	Remarks
9977	Lance-Sergt.	Walden, W. C.	11.12.05	Posted to Lichfield Co. R.A.M.C. (Militia).
10107	Corporal	Freeman, C.	6.12.05	Posted to Devonport Co. R.A.M.C. (Militia).

Reversions.—The following Lance-Corporals are reverted to their permanent rank from the dates specified against their names:—No. 14410 S. T. Riley, October 1, 1905; No. 16949 G. Ireland, October 1, 1905; No. 15230 P. Conway, October 17, 1905.

Buglers.—The undermentioned Boys are appointed Buglers from the dates specified against their names:—No 19135 W. H. Quelch, October 1, 1905; No. 19595 C. E. Bull, October 24, 1905; No. 19385 H. Johnson, December 14, 1905.

Notices.—The following decisions regarding appointments as Lance-Corporal are republished for general information:—

It is notified for general information that it has been decided that when making appointments as Lance-Corporals, Privates of the Nursing Section, if qualified and suitable in all respects, shall receive preference over qualified Privates of other Sections.

Half of the existing vacancies may be filled by the appointment of men in this Section, the remainder being divided among qualified candidates of the other Sections; but should there be a deficiency of candidates in the Nursing Section, qualified Privates of other Sections may be appointed to complete the authorised establishment of Lance-Corporals.

NOTES FROM ALDERSHOT.—"*Tin Hall Concert.*—The Band of the Royal Army Medical Corps gave an excellent concert on Monday last. The strings and wind were both of excellent quality, and all the items were played with precision and spirit. The band is strong, and the Corps is to be congratulated on such a body of instrumentalists. The bandmaster, Mr. Bennett, must have been gratified with the success which has attended his hard work. The band items comprised the overture to 'Zampa,' a selection from 'The Spring Chicken,' an entr'acte, 'Das lustige Negerlein,' a selection from 'The Catch of the Season,' an incidental 'Monsieur Beaucaire,' the two latter being beautifully played, and a two step, 'Mumblin' Moss.' Lieutenant Newland's fine voice did full justice to his songs, 'The Deathless Army,' and as an encore he substituted 'The Veteran.' Miss Mabel Finley gave very acceptable renderings of 'Cupid at the Ferry' and 'Lady Moon,' the first of these was re-demanded, when she sang 'Wishes and Fishes.' Mrs. H. S. Peeke's renderings of the songs 'There is a land of Roses,' and 'Under the Bamboo Tree' were most acceptable. The recitation of Quartermaster-Sergeant Ward, 'Timothy Prout,' necessitated his giving another, which was a parody on 'The Dream of Eugene Aram.' Lieutenant O'Carroll's voice was admirably suited in the songs, 'The way we have in the Army,' and 'Take a Pair of Sparkling Eyes,' which were beautifully rendered. Lieutenant Thompson was very funny in his songs in character, 'The Softest of the Family,' and 'Stop yer ticklin', Jock,' the latter being an encore for a medley with dance, which was very well done, as was the step dance of Corporal Pell; this item was watched with the greatest interest, and he received the heartiest applause for his performance. Bandsman Borland played a piccolo solo, 'The Linnet,' beautifully. A comic sketch 'The Mulligan Guards,' concluded the programme. It was performed by Quartermaster-Sergeant Ward and Sergeant Connell, and kept the audience in continual laughter." -*Aldershot News*, December, 15, 1905.

A photograph of the Band is given on page 28 of the "Corps News."

NOTES FROM WOOLWICH.—Lieutenant-Colonel M. O'D. Braddell, R.A.M.C., writes (January 8, 1906): "The usual Christmas festivities were duly observed at the Royal Herbert Hospital and in No. 12 Company, R.A.M.C. The wards were very prettily decorated under the supervision of the Matron (Miss Garriock) and nursing staff. At 1 p.m. the officer in charge (Lieutenant-Colonel Forman) accompanied by the other officers, visited the patients at their dinners, which were of a most ample and varied character, and were thoroughly enjoyed by the patients, who were attended to by the sisters, staff nurses and orderlies of the various wards. At 2 p.m. the men of No. 12 Company sat down to their dinner in the company dining hall (which had been decorated for the occasion) and did ample justice to the excellent food provided under the supervision of Sergeant-Major Tothill and Corporal Hearn. They were visited by Colonel Forman, Officer Commanding R.A.M.C., Woolwich District, and Lieutenant-Colonel Braddell, Officer Commanding No. 12 Company, for whom hearty cheers were given and healths cordially drunk. After the meal a Smoking Concert was held and passed the afternoon pleasantly away. The barrack rooms were decorated in the usual manner, expressions of goodwill to the officers being prominent.

"On Thursday, December 28, a Tea and Concert was held for the patients, the atter being a great success, owing to numerous ladies and officers of the garrison

BAND OF THE ROYAL ARMY MEDICAL CORPS.

helping Mrs. O'Keeffe to provide the musical part of the entertainment. Kind assistance was also rendered by ten performers from the splendid band of the Royal Artillery.

"On Friday, December 29, a Tea followed by a Christmas Tree was held for the families of No. 12 Company, all those 'off the strength' being invited, Mrs. Forman and the other officers' ladies having kindly arranged the whole thing and purchased suitable presents for all, the greatest thanks being due to them for all the time and trouble they took to make everything the success which it was, Miss Garriock and the ladies of Q.A.I.M.N.S., kindly assisting in looking after the wants of the little ones at the tea tables. Father Christmas (well personated by Staff-Sergeant Blanchette) called for cheers for Colonel and Mrs. Forman and the other ladies, which were heartily responded to by the children, who appeared to have thoroughly enjoyed their entertainment and appreciated the very pretty presents which they received."

NOTES FROM YORK.—Captain P. H. Collingwood, R.A.M.C., writes (December, 1905):—"*Christmas Festivities, No. 8 Company, R.A.M.C., York.* With a lovely Christmas morning, the Headquarter Detachment of No. 8 Company looked forward with glee to the participation of the splendid feast provided for them in the Recreation Room, which had been decorated in a most enchanting manner by the members. At 1 p.m. every non-commissioned officer and man sat down, and in a few moments our Commanding Officer, Lieutenant-Colonel I. B. Emerson, accompanied by Major H. C. Faichnie, Captain P. H. Collingwood, Lieutenant and Quartermaster W. J. C. Talbot, and the ladies of the Q.A.I.M.N.S. paid a visit to the room. In well chosen words the Colonel proposed the health of No. 8 Company. Hearty cheers were then given for the success and happiness of Colonel Emerson, Officers and Nursing Sisters. After dinner the remainder of the afternoon was given up to pleasant conversation. Five o'clock came quickly round, and once more the tables were laid with items too numerous to mention. Tea over, the Recreation room was prepared for the Concert, and by 8 o'clock was filled with friends and visitors, amongst whom were Colonel Emerson, Captain Collingwood, and Lieutenant and Quartermaster Talbot, the Chair being taken by Sergeant-Major Kay. The usual loyal toasts were proposed, and our Concert commenced. Songs were excellently rendered by Colonel Emerson, Staff-Sergeant Thomas, Sergeant Baxter, Sergeant Walker (A. O. C.), Sergeant Stevenson (18th Hussars), Corporal Colville, Privates Lucas, McConaghy, Higginbottom, Kelling, Noble, Gettings, Lomas and Talbot; recitations by Colonel Emerson and Private Talbot; pianoforte overtures and musical monologues by Sergeant Sharpe. At 11 o'clock the day was brought to a close with 'Auld Lang Syne' and 'God save the King,' everyone being more than delighted with the evening's entertainment. On Wednesday afternoon the married members of the headquarter detachment with their wives and children were gathered together for a social tea and entertainment, which had been provided by the Officers of the R.A.M.C. and the nursing sisters Q.A.I.M.N.S. Colonel O'Connell, Lieutenant-Colonel Emerson, Major Faichnie, Captains Collingwood and Woodside, and Lieutenant and Quartermaster Talbot, with their ladies, kindly assisted, and with the help of the nursing staff every one was well attended to. Aftea tea several games were enjoyed, and finally the Christmas Tree, loaded with presents for the children, was soon stripped, much to the satisfaction of the little ones. The party broke up about 8 p.m., having spent an evening not to be forgotten."

NOTES FROM GIBRALTAR.—Lieutenant-Colonel W. G. A. Bedford, C.M.G., R.A.M.C., writes (January 1, 1906): "Christmas was duly celebrated at the Military Hospital, Gibraltar, and arrangements were made by which all sections of the community connected with the institution could share in the season's festivities. On Friday, 22, the married families of the detachment met in the spacious dining-hall of the Hospital, and after enjoying tea, they were introduced to 'Father Christmas,' who distributed to the children of the Corps the presents taken from the gaily decorated tree. The dolls had been dressed by the ladies of the corps, and many of the costumes were wonderful works of art, and were much appreciated by the children. A series of merry games, part songs by some of the children, and the quaint antics of Private Swann, the detachment's talented comedian, who had kindly placed his services at the disposal of the guests, concluded an evening of real enjoyment and happiness for all. Colonel McNamara, the Officer Commanding the Detachment, Mrs. McNamara and Mrs. Bedford, Lieutenant-Colonel and Mrs. O'Connell, Major and Mrs. White, and many other officers and ladies of the Corps were present.

"*Christmas Day.*—Shortly after 1 o'clock on Christmas Day the detachment sat down

to dinner. The menu was worthy of the occasion. The decoration of the tables was kindly undertaken by Mrs. Spencer, wife of the Sergeant-Major, and their appearance was greatly admired. The scene of enthusiasm which followed the toast of His Majesty, proposed by the Officer Commanding, will not be easily forgotten by those present. In the evening an excellent concert was given by the members of the detachment in one of the temporary barrack rooms, the following contributing to the enjoyment of the company: Sergeant Eallett and Private Swann, Privates T. Smith and Croft, Lance-Corporal Lawrence, Sergeant Lake, Private Arkwright, Sergeants Whipp and Drummond, Privates Barney, Lawrence, Wooding, and Maywood, Sergeant Red, A.O.C., and Petty Officers Davey and Puncheon, R.N.; Quartermaster-Sergeant Ford and Private Carsberg presiding at the piano.

"*Boxing Day.*—All the patients allowed 'up' assembled in the dining hall for their sumptuous Christmas tea, while their less fortunate comrades who were unable to leave their wards were regaled with such delicacies as they were able to partake of. Tea being over the patients retired to enjoy their 'smokes,' which had been distributed to all while at tea, and the arrangements for converting the splendid hall into a concert room were then completed. At 8.30 the hall was again crowded with officers and ladies of the garrison, the soldiers and the married families of the Detachment, and more than a hundred of the patients. His Excellency the Governor, accompanied by his personal staff, honoured the performance. He was met at the entrance, and conducted to his seat by the Officer Commanding the Hospital, while the band of the Royal Munster Fusiliers played 'God Save the King.' Among the visitors were Major-General and Mrs. Dalton, Colonel McNamara (Principal Medical Officer) and Mrs. McNamara, and many officers and their wives, together with the Military and Naval Nursing Sisters. The Programme was as follows:—

PART I.

1. Overture .. .. ROYAL MUNSTER FUSILIERS' BAND.
2. Song .. .. "Peace" .. .. .. *The Country Girl.*
   SERGEANT DRUMMOND.
3. Song .. .. .. "The Sweet o' the Year" .. .. .. *Needham.*
   MRS. BANNING.
4. Comic Duet .. .. "Irish Jubilee."
   SERGEANT EALLET AND PRIVATE SWANN, R.A.M.C.
5. Selection.. .. .. .. "Veronique."
   THE BAND.
6. Song .. .."Beauty's Eyes".. .. .. *Tosti.*
   MAJOR WHAITE.
   With violin obbligato—MRS. DURNFORD.
7. Song .. .."Summer Rain".. .. .. .. *Willeby.*
   MRS. SCOTT.
8. Comic Song .. .. "It had the Desired Effect."
   CAPTAIN KNAPP.

PART II.

1. Duet, Flute and Clarionet .. THE BAND.
2. Song .. .. "Could I but Tell Her."
   MAJOR BURLEIGH LEACH.
3. .. .. "Two Gipsy Love Songs." ..
   MRS. SCOTT.
4. Song .. .. .. "The Star of Bethlehem."
   LANCE-CORPORAL LAWRENCE.
5. Violin Solo .. .. .. "Berceuse."
   MRS. DURNFORD.
6. Comic Song .. "'Twas the Only One the Poor Girl had."
   CAPTAIN KNAPP.
7. Song .. .. .. "Down the Vale" .. .. *Moir.*
   MRS. BANNING.
8. .. .. "A Song of Thanksgiving."
   MAJOR WHAITE.

"God Save the King."

"Where all did so excellently it would be invidious to specially notice any of the performers. As the inmates of hospital have to keep early hours no encores were allowed; 'one exception to prove the rule' being made, however, for Captain Knapp, whose comic songs are always vociferously encored. Hearty thanks are due to all the performers for the extremely pleasant evening they gave us, and Major Whaite, who kindly undertook the duties of Musical Director, is to be warmly congratulated on the success of his labours. The duties of accompanying the various vocalists were efficiently carried out by Mrs. Banning, Mrs. Leach, Miss Cowan, Miss Galgey, and Private Carsberg. Before departing, the officers doing duty at the hospital entertained their guests to light refreshments, which were served in the office of the Officer Commanding and in the Board Room. Thus ended the Christmas festivities, which—if they entailed considerable labour upon those responsible—undoubtedly gave great enjoyment to many and drew still closer the bonds of good feeling between all present."

Lieutenant-Colonel W. G. A. Bedford, C.M.G., R.A.M.C., writes at a later date: "The latest addition to the furniture of the military hospital is a bench of great historical interest. It was made, through the courtesy of the Royal Engineers, from a design supplied by the Officer Commanding the hospital, and is of sabicu, a wood but seldom met with nowadays. The wood originally formed a portion of a gun-carriage, which had been used during the ever memorable siege of the fortress, which lasted from 1779 to 1783.

"Details of this great siege, of the repeated, terrific bombardments, desperate sorties, and of the endurance displayed by the garrison during the years of investment, are well told in the famous history of the Siege of Gibraltar by Drinkwater, a recent edition of which has just been published at a popular price.

"A silver plate attached to the back rest of the bench records the pedigree of this historical article."

NOTES FROM HONG KONG.—Lieutenant B. A. Craig, R.A.M.C., writes (December 1, 1905): "His Excellency the Governor (Sir Matthew Nathan, K.C.M.G.), visited the Military Hospital this week, and also visited the new hospital at Bowen Road. The new hospital at Bowen Road is now nearly completed, and when finished will be one of the best east of Suez.

"Captains Lambelle, Harvey and Craig are under orders to return this month to England, tour expired, being relieved by Major Jones and Lieutenants Ryley and Frost.

"Lieutenant R. M. Ranking has passed his examination for promotion to Captain.

"*Corps Sports.*—The Cricket Team, under the able leadership of Captain Harvey, have this year joined with Army Ordnance Corps, Army Service Corps and Army Pay Department, and under the name 'Army Staff' have joined the League, and up to date have won every match, being the only unbeaten team. Captain Harvey is playing in great form, and has twice put up over 40 runs for the team. Private Latter, R.A.M.C., and Staff-Sergeant Wilson, R.A.M.C., have also made good scores. As most of the team return to England in the s.s. 'Dunera' it is hoped some keen cricketers are amongst the new arrivals. Lance-Corporal Bradford, A.O.C., took 7 wickets for 17 runs against one of the best teams in the League (Royal Garrison Artillery). The Royal Army Medical Corps Football Team is also doing well. Privates Holbrook and Ingmire, being exceptionally good at the game, have helped the team to win several matches. The weather here now is delightful, and looks as if it would last, being dry and bright."

NOTES FROM MIDDELBURG, TRANSVAAL.—Lieutenant-Colonel M. O'Halloran, R.A.M.C., writes (December 3, 1905): "It is with regret I have to report the death of Captain J. Waddell, R.A.M.C., on November 29, at the Military Hospital, of tuberculosis, aged 30. This promising young officer only arrived from home a few months ago. His funeral took place on Thursday, November 30, and his remains were followed to the cemetery by a large number of officers belonging to every Regiment and Corps in the Garrison. The bands of 2nd Leinster and 3rd Middlesex Regiments were in attendance. Several wreaths were placed on the coffin by his numerous friends, and sincere sympathy is felt for his sorrowing widow, who is at present in Ireland.

"There will be an Assault-at-Arms this month, and we have several entries, including three smart stretcher squads. We hope to be able to carry off some prizes in the Open Competitions. Cricket is flourishing, and already we have won several company matches."

QUEEN ALEXANDRA'S IMPERIAL MILITARY NURSING SERVICE.

Postings and Transfers at Home.—Matron: Miss M. Russell, R.R.C., from Alton to Military Hospital, York. Sisters: Miss B. N. Daker, on return from Indian Troopship duty s.s. "Plassy" to Queen Alexandra Military Hospital, Millbank, S.W.; Miss J. E. Dods, from Alton to Queen Alexandra Military Hospital, Millbank, S.W.; Miss L. E. Mackay, from Alton to Queen Alexandra Military Hospital, Millbank, S.W.; Miss L. M. Toller, from Portsmouth to Queen Alexandra Military Hospital, Millbank, S.W.; Miss L. M. Moor, from Royal Arsenal, Woolwich, to Military Hospital, Chatham. Staff Nurses: Miss K. A. Allsop, from Aldershot to Royal Herbert Hospital, Woolwich; Miss E. M. Bickerdike, from Alton to Military Hospital, Portsmouth; Miss J. G. Dalton to Military Hospital, Gosport, on appointment to Queen Alexandra's Imperial Military Nursing Service; Miss M. German, to Military Hospital, Gosport, on appointment to Queen Alexandra's Imperial Military Nursing Service; Miss E. B. Darnell, to Royal Arsenal, Woolwich, on appointment to Queen Alexandra's Imperial Military Nursing Service; Miss G. S. Jacob, from Alton to Connaught Hospital, Aldershot; Miss F. M. Tosh, from Alton to Connaught Hospital, Aldershot.

Postings and Transfers Abroad.—Sister: Miss S. K. Bills, from Queen Alexandra Military Hospital, Millbank, S.W., to s.s. "Plassy" for Indian Troopship duty. Staff Nurse: Miss M. E. Neville, to Malta, on expiration of sick leave.

Resignation.—Miss A. E. Tait, Matron, resigns her appointment, and is granted permission to retain the badge of Queen Alexandra's Imperial Military Nursing Service, in recognition of her meritorious service.

ARMY MEDICAL RESERVE OF OFFICERS.

Surgeon-Major Thomas Philip, M.B., to be Surgeon-Lieutenant-Colonel, dated December 4, 1905.

ROYAL ARMY MEDICAL CORPS (MILITIA).

Captain (Honorary Captain in the Army) J. T. Simpson is granted the honorary rank of Major, dated December 23, 1905.

ROYAL ARMY MEDICAL CORPS (VOLUNTEERS).

Scottish Command (Aberdeen Companies).—Lieutenant P. Mitchell, M.D., to be Captain, dated December 20, 1905.

London District: London Companies.—Captain C. T. D. Urquhart, M.B., is seconded, under the conditions of paragraph 90, Volunteer Regulations, whilst residing in South Africa, dated December 23, 1905.

Captain F. J. L. Warwick, M.B. (Transport Officer), resigns his Commission, dated December 23, 1905.

Lancashire and Border Bearer Company.—Supernumerary Surgeon-Captain W. B. Cockill, from the 2nd (Westmoreland) Volunteer Battalion The Border Regiment, to be Captain, and to command, dated December 30, 1905.

VOLUNTEER OFFICERS' DECORATION.

The King has been graciously pleased to confer the Volunteer Officers' Decoration upon the undermentioned Medical Officers of the Volunteer Force, who have been duly recommended for the same under the terms of the Royal Warrant, dated July 25, 1892 :—

EASTERN COMMAND.

1st Cinque Ports Royal Garrison Artillery (Volunteers).—Surgeon-Lieutenant Edward Alexander White, M.D. Surgeon-Lieutenant John William Harrison.

1st Volunteer Battalion, The Queen's Own (Royal West Kent Regiment).—Surgeon-Major Charles Boyce, M.D., Brigade-Surgeon-Lieutenant-Colonel, Senior Medical Officer, West Kent Volunteer Infantry Brigade.

SCOTTISH COMMAND.

The Highland Royal Garrison Artillery (Volunteers).—Surgeon-Major Murdo Mackenzie.

5th (Glasgow Highland) Volunteer Battalion, The Highland Light Infantry.—Surgeon-Major Quintin Chalmers, Brigade-Surgeon-Lieutenant-Colonel, Senior Medical Officer, Highland Light Infantry Volunteer Infantry Brigade.

SOUTHERN COMMAND.

2nd Volunteer Battalion, The Hampshire Regiment.—Surgeon-Lieutenant-Colonel Arthur Breedon Wade, M.B.

WELSH AND MIDLAND COMMAND.

Surgeon-Lieutenant-Colonel John Payne Massingham.

IMPERIAL YEOMANRY.

Royal East Kent (The Duke of Connaught's Own).—Surgeon-Lieutenant R. L. Moorhead, M.B., to be Surgeon-Captain, dated September 12, 1905.

OTHER VOLUNTEER CORPS.

1st Hertfordshire (Volunteer) Battalion, The Bedfordshire Regiment.—Surgeon-Lieutenant C. F. Wightman resigns his Commission, dated December 20, 1905.

1st Volunteer Battalion, The Durham Light Infantry.—Surgeon-Lieutenant-Colonel and Honorary Surgeon-Colonel G. Middlemiss, M.D., resigns his Commission, with permission to retain his rank and to wear the prescribed uniform, dated December 20, 1905.

The Highland, Royal Garrison Artillery (Volunteers).—Surgeon-Captain J. M. Moir, M.D., to be Surgeon-Major, dated December 23, 1905.

4th Volunteer Battalion, The Royal Scots (Lothian Regiment).—Surgeon-Lieutenant J. T. Titterton resigns his Commission, dated December 23, 1905.

3rd Renfrewshire Volunteer Battalion, Princess Louise's (Argyll and Sutherland Highlanders).—Surgeon-Lieutenant C. Whish, M.B., to be Surgeon-Captain, dated December 23, 1905.

2nd Cinque Ports, Royal Garrison Artillery (Volunteers).—Surgeon-Captain C. R. Skyrme, M.B., resigns his Commission, dated December 30, 1905.

1st Volunteer Battalion, The Northumberland Fusiliers.—Surgeon-Major D. Stewart is granted the honorary rank of Surgeon-Lieutenant-Colonel, dated December 30, 1905.

2nd Volunteer Battalion, The King's Liverpool Regiment.—Surgeon-Lieutenant-Colonel and Honorary Surgeon-Colonel G. Westby (Brigade-Surgeon-Lieutenant-Colonel, Senior Medical Officer, Liverpool Volunteer Infantry Brigade) resigns his

Commission, with permission to retain his rank and to wear the prescribed uniform, dated December 30, 1905.

3rd Volunteer Battalion, The Lincolnshire Regiment.—Surgeon-Lieutenant-Colonel F. J. Walker is granted the honorary rank of Surgeon-Colonel.

1st Volunteer Battalion, The Leicestershire Regiment.—Surgeon-Lieutenant-Colonel R. B. Smith (Brigade-Surgeon-Lieutenant-Colonel, Senior Medical Officer, Leicester and Lincoln Volunteer Infantry Brigade) is granted the honorary rank of Surgeon-Colonel, dated December 30, 1905.

3rd Lanarkshire Volunteer Rifle Corps.—Surgeon-Captain T. Forrest, M.B., to be Surgeon-Major, dated December 30, 1905.

3rd (Duke of Connaught's Own) Volunteer Battalion, The Hampshire Regiment.—Surgeon-Major E. J. Hunter (Brigade-Surgeon-Lieutenant-Colonel, Senior Medical Officer, Hampshire Volunteer Infantry Brigade), to be Surgeon-Lieutenant-Colonel, dated June 13, 1904.

The undermentioned Surgeon-Lieutenant-Colonels are granted the honorary rank of Surgeon-Colonel:—C. Knott, dated December 30, 1905; E. J. Hunter (Brigade-Surgeon-Lieutenant-Colonel, Senior Medical Officer, Hampshire Volunteer Infantry Brigade), dated December 30, 1905.

1st (Renfrewshire) Volunteer Battalion, Princess Louise's (Argyll and Sutherland Highlanders).—Surgeon-Major T. Philip, M.B., to be Surgeon-Lieutenant-Colonel, dated December 30, 1905.

1st Fifeshire Royal Garrison Artillery (Volunteers).—William Elmslie Henderson, Gent., to be Surgeon-Lieutenant, dated January 10, 1906.

2nd Volunteer Battalion, The Loyal North Lancashire Regiment.—Surgeon-Lieutenant-Colonel E. M. Garstang, M.D., is granted the honorary rank of Surgeon-Colonel, dated January 10, 1906.

1st Volunteer Battalion, The King's (Shropshire Light Infantry).—William Dyson, Gent., to be Surgeon-Lieutenant, dated January 10, 1906.

ROYAL ARMY MEDICAL COLLEGE.

The following copies of examination papers are published for information:—

Examination of Captains for Promotion to Major.

Practical Hygiene (for Whole Class).—Wednesday, December 20, 1905. From 10 a.m. to 1 p.m.

(1) Examine qualitatively the water sample, and also estimate quantitatively its chlorine, oxygen consumed and total hardness. The sample has been obtained from a deep well in the chalk. Its total bacterial content count has worked out at 330 micro-organisms per cubic centimetre, nearly all of which liquefy gelatine. The character of these micro-organisms has been found to be very motile small curved rods, some being almost like a coccus. The gelatine colonies appeared at thirty-six hours as minute white points with an irregular margin; liquefaction set in slowly but definitely. In broth they caused a diffuse turbidity with a thin pellicle. In gelatine stab cultures, well marked liquefaction as a funnel-shaped depression was apparent on third day. In milk they caused no apparent change. On potato, the growth was not characteristic. Indol was rapidly produced in peptone solutions with production of nitrite, as evidenced by addition of acid. All bile-salt glucose broth tubes were acidified, but no gas production. Lactose and sucrose were unaffected.

Give a critical report as to the fitness or otherwise of the water for drinking purposes.

(2) Determine the presence or absence of a preservative in the milk sample.

Note.—The strength of the various standard solutions is given on the blackboard.

Hygiene (for Whole Class). Written. Wednesday, December 27, 1905. From 10 a.m. to 1 p.m.

(1) Write out concise and exact directions for a non-commissioned officer who is detailed to undertake or supervise the disinfection of a set of married quarters in barracks in which a case of scarlet fever has been treated.

(2) Give a summary of the various methods suggested for sterilising, or at least rendering safe, drinking water for troops in the field. Which methods do you consider the best and most practicable?

(3) What do you understand by paratyphoid infections? Discuss their epidemiological significance and give a short account of the biological position of the micro-organisms usually associated with this class of disease.

(4) Summarise the main facts in regard to the etiology of plague, and indicate on what lines measures for its prevention and control must be based.

(5) Discuss the present position of sanitation in the British Army, pointing out how far it has been successful or unsuccessful in the diminution of preventable disease among soldiers. Explain your views as to on what lines present defects may or should be remedied.

Pathology.—Practical Examination, December 30, 1905. From 10 a.m. to 1 p.m.

(1) Examine the bacterial culture provided, and write a short account of the results of your examination. Leave stained specimens of the culture, properly labelled, beside your microscope.

(2) Examine the sample of pus, with a view to determining the presence and nature of any micro-organisms it may contain. Leave your stained specimens as above, and write a short account of what you may find.

(3) Oral examination.

Pathology (for Class). Written Examination. December 27, 1905. From 2.30 p.m. to 5.30 p.m.

(1) What is meant by the "Colour Index" of a blood? Explain the manner in which it is determined, and contrast the principal anæmias as regards variations in its value.

(2) What are the chief morphological and cultural characteristics of the *Bacillus diphtheriæ?* Describe its distribution in the tissues, and the manner in which it produces the symptoms of the disease.

(3) Discuss the question of the probable mode of infection in Malta Fever in the light of the recent investigations of the Malta Fever Commission.

(4) Describe and contrast the gametes of the three varieties of the malaria parasite, mentioning, in each case, how they may be distinguished in their immature stage from young sporing forms.

Bacteriology (Special Subject).—Written Examination. December 28, 1905. From 10 a.m. to 1 p.m.

(1) Discuss the question of the infectivity of plague, and describe in detail your procedure in making a bacteriological diagnosis from a case suspected to be one of this disease.

(2) What are the principal bacterial vaccines which have been employed in the treatment or prophylaxis of disease in man? Select two of these for the purpose of giving, first, a detailed description of the methods by which they are prepared, and second, a general account of the blood changes brought about by their use.

(3) Describe the "side-chain theory" of Ehrlich, as affording an explanation of the mode of action of antitoxins.

(4) Enumerate the diseases of man in which insects play a part in transmission, indicating, in each instance, the nature of that part. Give a detailed description of the chain of events in any one of these diseases, with the exception of malaria.

Bacteriology (Special Subject).—Practical Examination. 1st day, December 28, 1905. From 10 a.m. to 1 p.m.

(1) Examine carefully the two cultures, A and B. Write a short account of the results of your examination, and give your opinion, first, as to the probable nature of the micro-organism, second, as to the presence or absence of contaminations. Leave stained specimens, properly labelled, beside your microscope.

(2) Mount the paraffin block on a microtome, cut sections and examine them, reporting on the nature of the tissue, and the presence or absence of protozoa or bacteria. Label your specimens as above.

(3) Examine carefully the slides marked 1, 2 and 3, and describe shortly what you find.

2nd Day, December 29, 1905. From 10 a.m. till 1 p.m.

(1) The animal provided is supposed to have died of a bacterial disease.

Make a microscopical examination of its blood, and of the principal organs, with a view to determining the nature of the micro-organism and its distribution in the body.

Write a short account of the results of your examination.

Label your stained specimens as directed.

(2) The blood films marked A and B have been taken from cases supposed to be malarial in nature.

Stain and examine them, reporting 1st, on the character of the parasites, if found; 2nd, on the presence, or absence, of leucocytosis or any other abnormality.

(3) Oral examination as to specimens displayed under the microscope.

Practical State Medicine (Special Subject). 1st day.—Thursday, December 21, 1905. From 10 a.m. to 1 p.m.

(1) Determine the percentage of lactose and sucrose in the solution marked A.

(2) Determine the percentage of dissolved oxygen in the solution marked B.

(3) Determine the volatile fatty acids in the sample of fat before you, and state whether it is pure butter fat or a mixture of butter and some foreign fat.

Practical State Medicine (Special Subject). 2nd day.—Friday, December 22, 1905. From 10 a.m. to 1 p.m.

(1) Determine the percentage of proteid in the sample of meat extract. One gramme of the extract has been so treated that it is ready for distillation. Explain the full details of the process by which the estimation is made, including what you assume has been done already for you.

(2) The solution marked C contains a caustic alkali. Determine the specific gravity of the solution and estimate its percentage causticity in terms of caustic soda.

(3) Examine and report upon the probable identity of the two cultures (1) and (2) which will be given you.

Note.—Question 3 will be worked out in the Bacteriological Class Room, to which you will adjourn at 12 noon.

State Medicine (Special Subject). Written.—Friday, December 22, 1905. From 2.30 p.m. to 5.30 p.m.

(1) Give a short account of recent evidence as to alleged risks attaching to small-pox hospitals in the dissemination of that disease to neighbouring communities.

What differences are likely to show themselves in the course of vaccinia: (*a*) When the lymph is taken direct from the calf; (*b*) when glycerinated calf lymph is used? How does vaccination control or modify small-pox when the vaccinated person has already been infected with small-pox?

(2) Discuss briefly the theory of dietaries. Give a short account of recent work on proteid chemistry and metabolism, explaining what bearing this has upon practical dietetics.

(3) What is meant by standardisation of disinfectants? Describe briefly a method by which this can be done.

(4) Give a summary of the principal methods which have been suggested for the routine isolation of the enteric bacillus from water. Explain in detail any one method with which you may be familiar.

(5) Describe how ordinary nutrient broth, as used in bacteriological work, is prepared; also explain fully how you would standardise it so that its final reaction should be + 10.

EXAMINATION OF MAJORS, R.A.M.C., FOR PROMOTION, NOVEMBER, 1905.

Army Medical Organisation in Peace and War.—Time allowed: three hours (Total marks 100).

(1) What is the position and what are the duties of a Principal Medical Officer on lines of communication? (25 marks).

(2) What are the regulations as to the medical attendance, while on furlough, of:—

(*a*) Non-commissioned officers and men on married roll?

(*b*) The families of such men? (15 marks).

(3) What is a non-dieted hospital?

Under what circumstances would one be established at home?

How does such a hospital differ from a dieted hospital as regards equipment, attendants and feeding? (20 marks).

(4) Sketch the organisation of hospital ships. (20 marks).

(5) A battalion is under orders for active service. State fully the procedure to be followed in connection with the required medical examination of such battalion. (20 marks).

Sanitation and Epidemiology.—Time allowed: three hours. (Total marks 100). [N.B.—Each question has the same value.]

(1) Write out concise and exact directions for a non-commissioned officer who is

about to undertake or supervise the disinfection of a set of married quarters in barracks in which a case of scarlet fever has been treated.

(2) Discuss the main facts in regard to the etiology of plague, and indicate on what lines measures for its prevention and control must be based.

(3) To what extent, approximately, per thousand of strength, do enteric fever, malarial affections, and venereal diseases prevail in the British Army (European troops) in (*a*) United Kingdom, (*b*) India? Write a short summary of the chief measures to be taken to prevent the prevalence of any two of these diseases among soldiers.

(4) It is not unusual to speak of a disease being the result of climate. Discuss the scientific accuracy of this statement.

(5) In investigating the cause of an outbreak of disease in a community, what is the method of reasoning employed, and what fallacies are likely to arise in the process? Illustrate your answer by an example.

(6) Name the principal zymotic diseases. As regards each, state whether, and if so how, the attack-rate and death-rate are generally influenced by sanitary circumstances. Specify, particularly as regards each disease, what are the sanitary circumstances which you regard as having any such influence.

Selected Subject.—Time allowed: three hours. (Total marks 100). [N.B.—Candidates to answer either I. or II. at option, not both.]

I.—*Medical History of More Important Campaigns.*

(1) Eastern Soudan Expeditionary Force:—
  - (*a*) Write a medical report of the action of Tamaai, including the period from the landing of the head-quarter staff at Suakin (March 7, 1884) to the final despatch of the sick and wounded in the "Jumna" (March 16, 1884). (50 marks).

(2) Suakin Expeditionary Force, 1885:—
  - (*a*) Give in detail the medical personnel (Officers only) and their distribution. (10 marks).
  - (*b*) What hospitals were provided, where were they located, and what was their accommodation? (15 marks).
  - (*c*) Give an account of the medical history of the fight at McNeill's zareba, *i.e.*, the period comprised between March 22 and 24, 1885. (25 marks).

II.—*Army Medical Services of Other Powers.*

(1) Give a detailed sketch of the medical organisation of the Russian Army; or, of any other foreign army you may select. (80 marks).

(2) Contrast *briefly* the selected organisation with that of the British Army, indicating points of difference and similarity. (20 marks).

LIFE SAVING—PRESENTATION.

His Excellency presented the Vellum of the Royal Humane Society this morning to Major E. H. Myles, R.A.M.C., (R.), for an act of bravery in swimming out to the rescue of Mr. Bedford, when in danger of drowning at the bathing places last summer. The General, in a few well chosen words, expressed his appreciation of the bravery of Major Myles and hoped he would live long to enjoy the distinction conferred upon him.—(The *Star*, Guernsey, Thursday, January 11, 1906.)

The act of bravery for which Major Myles was presented the Vellum was fully described in a previous issue of the "Corps News."

ROYAL MASONIC INSTITUTION FOR BOYS.

ELECTION, APRIL, 1906.

The votes and interest of the Patrons, Presidents, Governors, Subscribers, &c., of the Institution are earnestly solicited on behalf of Henry Percy Mackinnon, age 9, son of the late Brother Lieutenant-Colonel H. W. A. Mackinnon, D.S.O., R.A.M.C., who died March 24, 1905, leaving his widow and two children (a girl, aged 10, in addition to the above-named), almost totally unprovided for.

The widow's sole means of support is the interest on £250 invested at 4 per cent.

The widow and children are ineligible for pension or compassionate allowance from Army funds, owing to disparity of age between Mrs. Mackinnon and her late husband, although they had been married twelve years.

Brother Mackinnon was initiated in St. John the Evangelist Lodge, No. 1483, Punjab, in March, 1874; was a member of St. John and St. Paul Lodge, No. 349, Malta, from 1877 to 1880 (served as J.W.); was a member of Pentangle Lodge, Chatham, from 1881 to 1883; was latterly for some years a member of Army and Navy Lodge, Aldershot, No. 1971.

In the Royal Artillery he belonged to Chapters 349, 407 and 782.

In the Mark, he had been a member of Lodges Nos. 107, 248 (W.M. and Founder), 311 (Founder).

In K.T. was a member of St. George's (P.P.), and St. Michael's Preceptories (Founder).

In A. and A. Rite had taken 18°, and had been a member of Rose of Sharon and Rose and Lily Chapters.

The case is strongly recommended by the Provincial Grand Lodge of Hampshire and the Isle of Wight; the Deputy Master and Brethren Aldershot Army and Navy Lodge, No. 1971; the Worshipful Master and Brethren Household Brigade Lodge, No. 2614; the Deputy Master and Brethren Nil Sine Labore Lodge, No. 2736; Right Worshipful Brethren Right Hon. the Earl of Euston, Prov. G.M. North. and Hunt.; Brigade-Surgeon J. Balfour Cockburn, M.D., Prov. G.M. Guernsey and Alderney; Sir Augustus F. W. E. Webster, Bart., Prov. G.M. Hants and Isle of Wight; Right Hon. the Earl of Onslow, G.C.M.G., P. Prov. G.M. Surrey; Field-Marshal the Right Hon. Earl Roberts, V.C., K.P., G.C.B., &c., &c., Past Grand Warden; Very Worshipful Brother Sir Edward Letchworth, Grand Secretary, Vice-Patron and Past Treasurer; Worthy Brethren Major J. E. Le Feuvre, V.D., P.G.D., P. Dep. Prov. G.M. Hants and Isle of Wight; Arthur H. Bowles, P.G.D., W.M. Astolat Lodge, No. 2858; P. M. Wey Side Lodge, No. 1395; Dr. John H. Salter, P.G.D., Dep. Prov. G.M. Essex; Lieutenant-Colonel H. Grier, R.A.M.C., P.G.D.; Colonel Sir James Clark, Bart., C.B.; Edgar Figgess, P.G. Std. B., P. M. Tuscan Lodge, No. 14; George J. Fowler, P.M. Iris Lodge, No. 2545; Brigadier-General Francis Lloyd, C.B., D.S.O., Dep. Master Lodge No. 1971; Colonel Charles J. Blake, R.A., P.M. St. John and St. Paul Lodge, No. 349; Colonel Robert G. Gordon-Gilmour, C.B., M.V.O., D.S.O., P.M. Household Brigade Lodge, No. 2614; Colonel H. E. R. James, Com. R.A.M. Coll.; J. G. Pilcher, J.P., D.L.; G. Crawford Thomson, M.D., W.M. Cheselden Lodge, No. 2870; Captain W. Lyons, P. Prov. G.D., P.M. Aldershot Camp Lodge, No. 1331; the Rev. Bernard Harvey, W.M. Hertford Lodge, No. 403; Lieutenant-Colonel H. W. Morrieson, R.A., P.M. Centurion Lodge, No. 1718; Colonel F. W. B. Landon, C.B., P.D.M. Nil Sine Labore Lodge, No. 2736; Lieutenant-Colonel J. G. Harwood, P.M., P.D.G.M. Bengal; the Rev. C. Rushbrook Nunn, P.P.G.C. Cheshire, and by Worthy Brother Major H. Pidcock-Henzell, P.M., P. Prov. G.W., J.P., Pinehurst, Farnboro', Hants, by whom proxies will be thankfully received.

Officers may, perhaps, be able to render assistance in this case by giving votes, or by securing the support of friends who may have votes for the Royal Masonic Institution. The case is strongly recommended, and is one of special urgency. Communications in this matter should be addressed to Major T. McCulloch, R.A.M.C., 68, Victoria Street, S.W.

REGISTER FOR INDIAN SERVANTS.

Few officers on going to India have not experienced the difficulty of getting good servants. The discomforts on arrival and of a long journey up country, unprovided with a bearer, or, what is worse, provided with a hastily selected man, taken haphazard from the crowd of indifferent or bad characters who congregate in Bombay, have fallen to the lot of most of us; whilst the period of trial and vexation, until a proper staff of servants is secured, is familiar to us all.

In our Corps, with regular annual reliefs, it should not be difficult to arrange for an interchange. Officers leaving India would then be able to provide places for the good and tried retainers they are relinquishing, and new arrivals would, by taking on these men, be spared many of the worries and troubles which now befall them. Further, good servants would not be lost to the Corps, and the prospects of continuous employment could not fail to have attraction for the better class of men.

With these ends in view, officers due home from India are requested to communicate to the Journal particulars of servants whom they can recommend, so that officers going out in relief may have an opportunity of securing these men. The particulars required are :—

(1) Class of servant.
(2) Whether for bachelor or married officer.
(3) District or station to which he belongs.
(4) Any special recommendations.

NOTE.—The date the officer leaves India should also be stated, and when and where the servant will be available.

The following are the particulars of a servant whom Major F. A. Saw, R.A.M.C., thoroughly recommends :—

(1) M. David.
(2) Butler. Married Officer.
(3) Secunderabad. Care of J. C. Pringle, R.E., Secunderabad Club, Secunderabad, Deccan.
(4) Is a thoroughly good and reliable man and speaks good English.

THE MULVANEY CUP.

A very handsome Cup has been kindly presented by Mrs. Mulvaney, in memory of the late Lieutenant-Colonel Mulvaney, R.A.M.C., to be competed for by football teams from the various companies in the Aldershot Army Corps

BIRTH.

KEARNEY.—On December 20, 1905, at 4, Belmont Road, Wrexham, the wife of Major J. Kearney, R.A.M.C., of a son.

MARRIAGE.

POLLOCK.—JAY.—On January 4, at Felixstowe, by the Rev. T. Colligan, Major C. E. Pollock, R.A.M.C., son of the late A. R. Pollock, of Paisley, J.P. for the county of Renfrew, to Winifred Mabel, youngest daughter of C. E. H. Jay, late of the War Office, of Glenesk, Felixstowe.

THE ROYAL ARMY MEDICAL CORPS FUND.

THE TWENTY-SECOND MEETING OF THE COMMITTEE.

The Twenty-Second Meeting of the Committee was held at 68, Victoria Street, S.W. on Tuesday, January 16, 1906, at 4.30 p.m.

Present.

Surgeon-General A. Keogh, C.B., Director-General A.M.S., Chairman.
Surgeon-General Sir Charles McD. Cuffe, K.C.B. } Representing Retired Officers.
Lieutenant-Colonel E. M. Wilson, C.B., C.M.G., D.S.O. }
Lieutenant-Colonel A. B. Cottell. }
Lieutenant-Colonel Sir James Clark, Bart., C.B. }
Surgeon-General W. J. Fawcett, C.B.
Colonel A. T. Sloggett, C.M.G.
Colonel H. E. R. James.
Major H. C. Thurston, C.M.G.
Captain G. St. C. Thom.

Minutes.—(1) The Minutes of the Twenty-First Meeting were confirmed.

(2) Lieutenant-Colonel Sir James Clark, who took his seat on the Committee as representing Retired Officers, in place of Lieutenant-Colonel E. Fairland, resigned, was thanked by the Chairman for having responded to the invitation to join this Committee. Sir James Clark replied that he was proud to accept a position which would enable him to be of use to the Corps.

(3) The Report of a Quarterly Meeting of the Aldershot Sub-Committee held at Aldershot on January 8, 1906, was approved.

(*a*) The quarterly account to December 31 last, of the Widows' and Orphans' Fund, was approved and is appended to these Minutes, together with the detailed statement of cases receiving relief.

(*b*) The quarterly accounts of the General Relief Branch, to December 31 last, were approved and are appended to these Minutes, as well as the detailed statement of cases receiving relief.

A sum of £35 was voted from the General Relief Fund for the expenses of the current quarter.

(*c*) The quarterly accounts of the Band Fund, to December 31 last, were approved and are appended to these Minutes.

A sum of £72 was granted from the Royal Army Medical Corps Fund for the current quarter's expenses, which include the purchase of two Clarionets at a cost of nine guineas each.

(4) *The Band.*—The question of the Band was again under discussion. The Chairman pointed out that if the Band as at present constituted is to be maintained in a really efficient state, and provided with new instruments as required, the expenditure at present being incurred will have to be maintained. This expenditure at the present rate, calculated from that of the last quarter (£80) and the present quarter (£72), will require an income to meet it of about £300 a year.

The income last year was £226 and there is no reason to expect any large increase on this income during the present year. This points to excess of expenditure over income of about £70 for the current year. To meet this there is a balance of about £38.

These figures indicate the probability that the Band will be without funds during the last quarter of the current year.

It becomes, therefore, a serious consideration to provide against this condition. The Chairman said that if the Corps was of opinion that the subscription to the Memorial Branch of the Royal Army Medical Corps Fund might be reduced by 2s. 6d., and that 2s. 6d. transferred to the Band, an additional income of £115 per annum would be secured, making an annual income of about £345, as for as can be judged. This sum would probably guarantee a sufficient income to the Band so long as it is carried out under present conditions; but in view of the fact that there is a strong opinion in the Corps, in which he shared, that the band should be increased in numbers and efficiency, he thought that the next General Meeting should take the matter seriously into consideration, and in order to enable officers to form a just opinion of the exact steps which are advisable he recommended that a Sub-Committee should be appointed to present a Report. His own view was, that as official recognition of the Band is out of the question, it appeared a matter for consideration whether the Aldershot Band should be allowed to lapse into one simply sufficient for the purposes of the depôt at Aldershot, and whether the Corps should maintain a civilian Band in London. This is a matter which the Sub-Committee might elaborate in its Report, furnishing a statement of the practicability and the cost of such a band.

The Committee unanimously agreed to the Chairman's proposal, and the following Sub-Committee was appointed; Colonel James, Chairman; Lieutenant-Colonel Sir James Clark; Lieutenant-Colonel A. B. Cottell; the Band President.

The above Sub-Committee was requested to endeavour to submit its Report by March 31 next, in order that this Committee may be able to publish its recommendations in the May number of the Journal, thus giving officers an opportunity for timely study of the question in all its bearings before the next General Meeting.

(5) The Committee resumed the consideration of Memorials to distinguished Officers, discussing the nature of Memorials to be erected to Officers. The Chairman suggested that the windows at the Royal Army Medical College might be found to be suitable for the insertion of stained glass, and in that case he thought we had an admirable vehicle for perpetuating the memory of great Army Surgeons, at the same time adding to the beauty of the College. The Committee unanimously agreed that the suggestion was a valuable one. Lieutenant-Colonel Wilson suggested that a scroll recording the names and records of distinguished officers would prove a valuable adjunct.

The question of a statue, or a bust of John Hunter, was also mooted.

The names of the following distinguished Army Surgeons were then selected as those for whom memorials should immediately be taken in hand: John Hunter, Richard Wiseman, William Harvey, G. J. Guthrie, Robert Jackson, T. R. Lewis, Henry Marshall, Thomas Alexander, J. A. Landon.

It was further agreed to adopt as a principle that all Director-Generals of whom pictures were not already in existence should be memorialised by portraits.

The following Sub-Committee was appointed to present a Report dealing with these matters, and containing specific recommendations as to the nature of the memorials to be erected to the above distinguished Officers: Surgeon-General Sir Charles Cuffe (Chairman); Colonel Sloggett; Colonel James.

(6) It was noted that the sum of £10 had been advanced from the General Relief Fund in December last to the Aldershot Sub-Committee for general relief purposes.

(7) The Director-General informed the Committee that Trust Deeds are being drawn up for the various prizes open to Officers of the Corps, and that the legal costs are proving a strain upon the finances of some of the funds. Two of these funds, the Marshall Webb and the Ranald Martin, are at present not in a position, except by trenching upon capital, to completely meet the legal charges incidental to framing the Trust Deeds, but as it is necessary that these Trust Deeds should be proceeded with at once the Director-General asked the Royal Army Medical Corps Fund to advance as a loan a sum not exceeding £10 from the Memorial Branch, the amount borrowed to be repaid by the above funds in instalments as money becomes available. The Committee agreed.

(8) The representation on this Committee of Junior Officers was arranged for in minute 2 of the second meeting as follows: "One Junior Captain, Royal Army Medical Corps, not necessarily a member of their Mess, to be elected by the Officers of the Royal Army Medical Corps' Mess at Aldershot."

Captain Thom informed the Committee that he would shortly be no longer eligible to represent these Officers, and asked the Committee to consider whether an Officer in the London District might be appointed, as it was found that the journey from Aldershot pressed heavily upon these officers. The Chairman pointed out that it was of the highest importance to this Committee that a member of the Aldershot Sub-Committee should be present at the meetings in order to maintain touch with the executive work being carried out by that Sub-Committee.

It was agreed that if Lieutenant-Colonel E. M. Wilson were a member of the Aldershot Sub-Committee, Captain Thom's suggestion could be carried out without detriment. It was then resolved that the representation of the junior ranks should be held by a Captain in London, nominated by the Principal Medical Officer, London District, from among the Officers stationed in his Command.

(9) It was agreed that the day and hour of meeting should in future be on a Friday at 3 p.m.

B. Skinner,
Lieutenant-Colonel, Hon. Sec.

January 17, 1906.

ROYAL ARMY MEDICAL CORPS COMPASSIONATE (WIDOWS' AND ORPHANS') FUND.

BALANCE SHEET FOR THE QUARTER ENDED DECEMBER 31, 1905.

RECEIPTS.

Date.	From whom received.	On what account.	£	s.	d.
1905.					
	Balance Credit last quarter	At Bank ..	12	2	2
		On Deposit and Interest[1] ..	229	2	4
Dec. 31	Bank..	Interest on Deposit.. ..	2	1	5
			£243	5	11

EXPENDITURE.

Date.	To whom paid.	On what account.	£	s.	d.
1905.					
Sept. 1 to Dec. 31	Various	Monthly disbursements to 19 Widows and 1 Orphan	82	0	0
Oct. 24	W. Savage ..	Rubber stamp	0	2	6
Nov. 9	Mrs. S.	Grant	10	0	0
Dec. 1	,, ...	,, ...	5	0	0
Dec. 31	Sgt. H. Cassell..	Clerk	0	10	0
		Postage	0	4	9
	Balance	At Bank..	14	4	11
		On Deposit and Interest[1]	131	3	9
			£243	5	11

Aldershot,
January 3, 1906.

Audited and found correct, January 4, 1906.
(*Signed*) G. W. ROBINSON,
Lieut.-Colonel R.A.M.C.

(*Signed*) G. ST. C. THOM, *Captain,*
Hon. Secretary.

[1] £100 has been transferred from the Deposit to the General Account during the quarter.

ROYAL ARMY MEDICAL CORPS COMPASSIONATE FUND—GENERAL RELIEF FUND.

BALANCE SHEET FOR THE QUARTER ENDED DECEMBER 31, 1905.

RECEIPTS.

Date. 1905.	From whom received.	On what Account.	£	s.	d.
	Balance Credit last quarter ..	.. ..	18	13	8
Oct. 18	Hon. Secretary, R.A.M.C. Fund	Grant	10	0	0
Dec. 16	Hon. Secretary, R.A.M.C. Fund	Ditto	10	0	0
			£38	13	8

EXPENDITURE.

Date. 1905.	To whom paid.	On what Account.	£	s.	d.
Sept. 1 to Dec. 31	Various	Disbursements to 5 cases receiving monthly relief ..	17	0	0
Nov. 9	Mr. N.	Grant	2	0	0
,, 23	Mr. C.	Ditto	1	0	0
Dec. 5	Major H. C. Thurston, R.A.M.C.	For urgent cases[1] ..	5	0	0
,, 9	Mr. A.	Grant	1	0	0
,, 15	Mr. S.	Ditto	1	0	0
,, ,,	Principal Medical Officer, Irish Command	Funeral expenses, Mrs. S.	3	0	0
Dec. 31	Sergeant H. Cassell ..	Clerk	0	10	0
		Postage	0	2	4
	Balance Credit at Bank	.. ..	8	1	4
			£38	13	8

Aldershot,
January 3, 1906.

Audited and found correct,
(*Signed*) G. W. ROBINSON,
Lieut.-Colonel R.A.M.C.

(*Signed*) G. ST. C. THOM, *Captain,*
Hon. Secretary.

[1] See account following.

ROYAL ARMY MEDICAL CORPS COMPASSIONATE FUND—GENERAL RELIEF.

STATEMENT OF RECEIPTS AND DISBURSEMENTS MADE BY MAJOR H. C. THURSTON, C.M.G., AT HEADQUARTERS, ON BEHALF OF THE ABOVE CORPS FUND, IN RELIEF OF URGENT CASES OF DISTRESS, &c.

RECEIPTS.

1905.			£ s. d.
Dec.	4	To Balance—Cash in hand	3 13 5
,,	6	From Hon. Secretary	5 0 0
			£8 13 5

EXPENDITURE.

1905.			£ s. d.
Nov.	29	By help given to F. W. P., on proceeding to Ipswich to take up an appointment as male nurse	1 0 0
Dec.	6	Advance to F. W. P., to be repaid by instalments	4 0 0
		Mrs. J., having been deserted by her husband	0 10 0
		Mr. F. G. A., for food and shelter pending obtaining work	0 10 0
		Balance—Cash in hand..	2 13 5
			£8 13 5

Headquarters,
January 3, 1906

ROYAL ARMY MEDICAL CORPS BAND FUND.

Balance Sheet for Quarter ending December 31, 1905.

Receipts.

			£	s.	d.
Oct.	1	Balance	6	1	3
,,	7	President, R.A.M. College Mess	5	3	9
,,	17	President, Aldershot Mess (Sept.)	4	5	0
,,	,,	Hon. Secretary R.A.M.C. Fund	80	0	0
Nov.	3	President, R.A.M. College Mess	15	11	3
,,	14	President, Aldershot Mess (Oct.)	3	17	6
Dec.	12	,, ,, ,, (Nov.)	8	17	6
,	,,	Holt and Co. (one subscription)	0	5	0
			£124	1	3

Expenditure.

			£	s.	d.
Oct.	3	Travelling Expenses, R.A.M. College.. ..	2	8	9
,,	17	,, ,, ,, ...	2	8	9
,,	24	,, ,, ,, ...	2	8	9
,,	31	Mr. Bennett's Salary	10	0	0
,,	,,	Bandsmen's Pay..	12	15	9
,,	,,	For Bandsmen's Services at College	8	5	0
Nov.	30	Mr. Bennett's Salary	10	0	0
,,	,,	Bandsmen's Pay..	12	2	6
Dec.	31	Mr. Bennett's Salary	10	0	0
,,	,,	Bandsmen's Pay..	12	18	4
,,	,,	Hawkes and Son..	30	15	8
,,	,,	Postage and Sundries	0	19	0
,,	,,	Balance	8	18	9
			£124	1	3

January 3, 1906.

(*Signed*) G. ST. C. THOM, *Captain*,
Hon. Secretary.

ROYAL ARMY MEDICAL CORPS COMPASSIONATE FUND.

The following have received relief during the Quarter ended December 31, 1905:—

Widows' and Orphans' Fund.

Name of recipient	Age	Number of children	If in receipt of a pension. Amount	Monthly grant from Fund	Total amount received from Fund	Remarks
Child P., Cahir	8	..	None	£1 5s.	£34 7s.	Child of the late 7150 Staff-Sergeant, who died at Sierra Leone. Guardian does not wish the child, who is not strong, to be placed in a school.
Mrs. S., London	37	3	None	£2	£72	Widow of a Private, and has heart disease. Children are all young.
Mrs. C., Norwich	39	2	None	£2	£61	Widow of a Private, and suffers from rheumatism. One child is in the Duke of York's School, and a girl, aged 10, at home, is delicate.
Mrs. R., Dublin	46	3	None	£2	£52	Widow of 2512 A. H. Corps; is in delicate health. Two eldest children have signs of tubercular disease.
Mrs. S., Dublin	62	..	None	£1 10s.	£56 10s.	Widow of a Corporal; decrepit and nearly blind.
Mrs. E., Dublin	43	3	None	£1	£45	Widow of a Staff-Sergeant; is in weak health. Youngest child 15 years and another delicate. Grant reduced from £2 on report of visiting officer.
Mrs. I., Dublin	63	1	None	£1 10s.	£39	Widow of a pensioner; daughter unable to help her.
Mrs. K., London	68	..	None	£1 10s.	£34 10s.	Widow of a pensioner; is too old to work.
Mrs. S., London	59	..	None	£1 10s.	£43 10s.	Widow of a pensioner; cannot work owing to ill health.
Mrs. H., Chester	46	4	None	12s. 6d.	£45 12s. 6d.	Widow of 15532 Corporal. Of children, one is partially a cripple, two are in schools, and the eldest helps a little. Grant reduced from 25s. on report of visiting officer.
Mrs. C., Chester	35	1	None	12s. 6d.	£40 12s. 6d.	Widow of 9938 Private; suffers from heart trouble. Does not wish child, aged 6, placed in a school. Grant reduced from 25s. on report of visiting officer.
Mrs. G., Dublin	50	4	None	£1 10s.	£19 10s.	Widow of 2737 Private; youngest child 12 years of age. In receipt of variable sums from two sons, sometimes nothing.

WIDOWS' AND ORPHANS' FUND.—*Continued.*

Name of recipient	Age	Number of children	If in receipt of a pension. Amount	Monthly grant from Fund	Total amount received from Fund	Remarks
Mrs. S., Kingston-on-Thames	32		None	£1	£13	Widow of 8974 Private; children are under 10 years of age. Grant discontinued after December, on recommendation of visiting officer.
Mrs. M., Dover	44	5	None	£1	£21	Widow of a Srgt.-Major. Four of the children are in homes; one, aged 8, is with her.
Mrs. E., Netley	56	..	None	£1 10s.	£9	Widow of 2798 Corpl. Recommended for 6 months by Prin. Med. Officer, Netley, which ceased in November, and grant was discontinued.
Mrs. B., Sevenoaks	38	..	None	£1	£5	Widow of a Sergeant-Major. Grant made until employment is obtained. Receives 3s. 6d. weekly locally. Recommended by A.M.O., Dover.
Mrs. G., London	39	5 and another expected	Nil	£1 10s.	£4 10s.	Widow of a Corporal, who died August 30, 1905. Two of the children are assisting her. Is unable to work owing to her condition. Grant made as a temporary measure. Two eldest children 18 and 16. Remainder under 8.
Mrs. M., Aldershot	52	4	None	£1	£4	Widow of a Sergeant-Major. Has three sons serving in the Corps who help her. She is unable to support herself. Children are all grown up.
Mrs. H., Dublin	59	2	None	£2	£6	Widow of 1721 Private. Children both grown up and unable to assist her. She cannot obtain employment, being unable to work.
Mrs. S., Portsmouth	60	2	None	..	£15	Widow of a Staff-Sergeant. Keeps a lodging-house, and grant made to pay her rent and give her a fresh start. Son 26 years of age and married. Daughter, aged 21, acts as servant to the lodging-house.
Mrs. T., London	48	6	Nil	..	£8	Widow of 3414 Staff-Sergeant. Was granted £2 to assist her, and was previously granted £6 towards a sewing machine to enable her to work.

GENERAL RELIEF FUND.

Name of recipient	Age	Number of children	If in receipt of a pension. Amount	Monthly grant from Fund	Total amount received from Fund	Remarks
Mrs. H., London	34	1	Nil	£1 10s.	£18	Wife of discharged Corporal 10552, who has deserted her.
Mr. L., Havant	35	1	Nil	£1	£70	Late 10001 Private M. S. C.; suffering from tubercle of lung. Is married and only does light work. Grant reduced to £1 on recommendation of visiting officer.
Mrs. W., Netley	27	3	None	£2	£4	Wife of 17530, a deserter. Children under six years of age. Grant discontinued, as woman left Netley to go to her relatives.
Mrs. D., Chester	..	..	None	£1 5s.	£2 10s.	Wife of 8767 Corporal. Grant made until she obtained a passage to South Africa to join her husband, who is serving there.
Mr. N., Knaresborough	46	4	8d. a day	..	£2	Late 7290. Was granted £2 to assist him while out of a situation. Suffers from epilepsy. Eldest child 11 years.
Mr. N., London	46	4	None	£2	£3	Late 5270. Children are being looked after by relatives, his wife being deceased. Has only one eye, the vision of which is very defective, and has caused him to lose his situation.
Mr. C., London	40	..	None	..	£1	Late 7718 Corporal. Was granted £1 to assist him while out of employment. Is not married.
Mr. A., London	51	2	1s. 1d. a day	..	£1	Was granted £1 to assist him while out of employment. Late Private R.A.M.C.
Mr. S., Farnboro'	38	1 (wife expects another)	None	..	£1	Was granted £1 to assist him while out of employment. Late Private R.A.M.C.
Mrs. S., Dublin	30	1	None	..	£32	Wife of 16169 Private, serving at Wynberg. £3 grant made to pay expenses. Was receiving £2 monthly from Fund before her admission to Infirmary.

Aldershot,
January 8, 1906.

(*Signed*) G. ST. C. THOM, *Captain*,
Hon. Secretary.

NOTICE TO SUBSCRIBERS.

Officers are particularly requested to give timely notice of changes of station or changes of address, in order to ensure the posting of the Journal to its correct destination.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, &c. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts and commands at home and abroad. All these communications should be written upon one side of the paper only, they should by preference be typewritten, but, if not, all proper names should be written in capital letters (or printed) to avoid mistakes, and be addressed to the Editor, Journal of the Royal Army Medical Corps, 68, Victoria Street, London, S.W.

Letters regarding subscriptions, non-delivery of the Journal, or change of address, should be sent to Major T. McCulloch, R.A.M.C., 68, Victoria Street, London, S.W.

Communications have been received from Colonel W. L. Chester; Lieutenant-Colonels M. O'Halloran, J. E. Nicholson (R.P.); Majors W. T. Mould, C. J. W. Tatham, J. S. Edye, Norman Faichnie, R. C. Lewis; Captains W. A. Ward, R. H. Fuhr, D.S.O., E. D. W. Greig, I.M.S.; Lieutenant R. G. Anderson; Lieutenant and Quartermaster F. Bruce; Dr. F. M. Sandwith, Dr. J. B. Christopherson.

In the event of reprints of articles being required by the authors, notification of such must be sent when submitting the papers. Reprints may be obtained at the following rates, and other reprints at proportionate rates:—

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The following periodicals have been received: *The Medical Record, The Medical News, New York Medical Journal, American Medicine, Gazette Med. de Paris, Archives de Medicine et de Pharmacie Militaires, Il Morgagni, Gazetta Medico-Italiana, The Medical Review, El Siglo Medico, Der Militärärzt, Deutsche Militärärztliche Zeitschrift, Anales de Sanidad Militar, Revue Med. de la Suisse Romande, La Medicina Militar Espanola, The Boston Medical and Surgical Journal, Annali di Med. Navale, Giornale del Regio Esercito, Le Caducée, The Hospital, The Ophthalmoscope, St. Thomas's Hospital Gazette, Bulletin de l'Acad. de Med. de Paris, Arch. Med. Belges, Voyenno Medisinskii, The Indian Medical Gazette, The Australasian Medical Gazette, Journal of the Association of Military Surgeons, U.S., Militärlagen ungwet af Militärlaegeforeningen, i Kjobenharn, The Veterinary Journal, The Practitioner, Public Health, Medical Review, The Army and Navy Gazette, The United Service Gazette, Journal of the Royal United Service Institution, The Johns Hopkins Press, The Health Resort and Journal of Spas and Sanatoria, Journal of the Royal Sanitary Institute, Journal of the U.S. Institution of India, Indian Public Health Bulletin de l'Institut Pasteur, Records of the School of Medicine, Cairo.*

We desire to remind members who have not paid their third year's subscription, which was due on July 1, 1905, that it is very important that such should be promptly paid.

NOTICE.

The Corps News is now printed as an inset to the Journal and separate copies may be subscribed for, price 2d. monthly.

JOURNAL

OF THE

ROYAL ARMY MEDICAL CORPS.

Corps News.

March, 1906.

ROYAL ARMY MEDICAL CORPS.—GAZETTE NOTIFICATIONS.

Colonel Jules I. Routh is placed on temporary half-pay on account of ill-health, dated January 8, 1906.

Lieutenant-Colonel Robert H. Forman, M.B., to be Colonel, *vice* J. I. Routh, dated January 8, 1906.

Major John H. Rivers, from the Seconded List, to be Major, dated January 17, 1906.

Captain Hamilton G. F. Stallard, from the Seconded List, to be Captain, dated January 7, 1906.

Lieutenant-Colonel John W. H. Flanagan is placed on retired pay, dated January 20, 1906. He entered the Service August 4, 1878; was promoted Surgeon-Major August 4, 1890; and Lieutenant-Colonel August 4, 1898. His war services are as follows: Afghan War, 1879-80. Served with the South Afghanistan Field Force. Medal. Zhob Valley Expedition, 1884.

The undermentioned Captains to be Majors, dated January 29, 1906:—

Michael Boyle, M.B.; Percy Evans, M.B.; Claude K. Morgan, M.B.; John M. Buist, M.B.; George St. C. Thom, M.B.

The undermentioned Majors are placed on retired pay, dated January 30, 1906:—

John G. Black, M.D.; Walter P. Squire; Stanley J. W. Hayman; Julian P. S. Hayes.

Major J. G. Black entered the Service January 30, 1886, and was promoted Surgeon-Major January 30, 1898. His war services are as follows: South African War, 1900-02. Relief of Ladysmith, including operations of January 17 to 24, 1900. Operations of February 5 to 7, 1900, and operations on Tugela Heights, February 14 to 27, 1900. Operations in Natal, March to June, 1900. Despatches, *London Gazette*, February 8, 1901. Queen's medal with five clasps. King's medal with two clasps.

Major W. P. Squire entered the Service January 30, 1886, and was promoted Major January 30, 1898. His war services are as follows: South African War, 1899-1902. Relief of Ladysmith, including operations of January 17 to 24, 1900, and action at Spion Kop. Operations of February 5 to 7, 1900, and action at Vaal Kranz. Queen's medal with three clasps. King's medal with two clasps.

Major S. J. W. Hayman entered the Service January 30, 1886, and was promoted Major January 30, 1898. His war services are as follows: Burmese Expedition, 1886-8. Medal with two clasps.

Major J. P. S. Hayes entered the Service January 30, 1886, and was promoted Major January 30, 1899. His war services are as follows: Nile Expedition, 1898. Egyptian medal. South African War, 1900-1902. Operations in Natal, March to June, 1900. Operations in the Transvaal, November, 1900, to April, 1902. Queen's medal with two clasps. King's medal with two clasps.

Lieutenant Richard J. C. Thompson, from the Seconded List, to be Lieutenant, dated January 31, 1906.

MEMORANDA.

Lieutenant-Colonel Alfred Peterkin, M.B., R.A.M.C., is granted the local rank of Colonel, while serving in Mauritius, dated November 22, 1905.

Lieutenant-Colonel George D. Hunter, D.S.O., R.A.M.C., is granted the local rank of Colonel, whilst employed with the Egyptian Army, dated January 24, 1906.

ROYAL ARMY MEDICAL COLLEGE.

Lieutenant-Colonel Arthur M. Davies to be Professor of Hygiene, *vice* Lieutenant-Colonel R. H. Firth, whose tenure of that appointment has expired, dated February 1, 1906.

Captain William S. Harrison, M.B., to be Assistant Professor of Pathology, *vice* Captain D. Harvey, M.B., whose tenure of that appointment has expired, dated February 1, 1906.

COLDSTREAM GUARDS.

Surgeon-Lieutenant-Colonel Warren R. Crooke-Lawless, M.D., is seconded for service on the Staff of the Viceroy and Governor-General of India, dated November 2, 1905.

ARRIVALS HOME.—From India: Majors C. H. Melville and W. C. Poole; Captains W. Bennett, F. W. Cotton, J. M. Cuthbert, A. E. Hamerton, D.S.O., F. McLennan, L. M. Purser, A. F. Weston, and J. W. West. From Ceylon: Lieutenant-Colonel R. D. Hodson and Lieutenant D. S. Skelton. From Singapore: Lieutenant-Colonel W. Dick, Major J. H. E. Austin, and Captain G. F. Sheehan. From South China: Captains W. J. S. Harvey and F. W. Lambelle. From North China: Captain E. V. Aylen. From Egyptian Army: Major J. H. Rivers.

ARRIVALS HOME ON LEAVE.—From Malta: Captain E. Ryan.

EMBARKATIONS.—For India: Lieutenant-Colonels S. F. Freyer, C.M.G., W. L. Reade, and Lieutenant M. Sinclair. For Malta: Majors G. S. Crawford and J. J. Gerrard; Lieutenants P. A. Lloyd-Jones, R. G. Meredith, J. St. A. Maughan, and F. E. Roberts. For Gibraltar: Major B. W. Longhurst and Lieutenant R. G. Anderson. For Egypt: Lieutenant C. V. B. Stanley. For India: Lieutenant-Colonel G. F. Gubbin, Captain C. G. Thomson, Lieutenants E. B. Booth, G. B. F. Churchill, P. Dwyer, C. D. M. Holbrooke, and A. A. McNeight.

POSTINGS.—Lieutenant-Colonel R. D. Hodson to Chatham. Lieutenant-Colonel W. Dick, Major J. H. E. Austin, Captains F. W. Cotton, L. M. Purser, L. F. Smith and A. F. Weston to Eastern Command; Majors H. A. Bray, F. Smith, Captains E. V. Aylen, B. B. Dinnis, and Lieutenant D. S. Skelton to Southern Command. Captain E. W. Bliss to Portsmouth as Specialist. Captain W. J. S. Harvey to Welsh and Midland Command. Captain H. G. F. Stallard to Aldershot. Captains J. M. Cuthbert, F. W. Lambelle, and F. McLennan to Scottish Command. Major W. C. Poole, Captains W. Bennett, C. E. Fleming, G. F. Sheehan, J. W. West and A. D. Waring to Irish Command.

EXCHANGES.—Colonels O. E. P. Lloyd, V.C., and A. E. J. Croly. Lieutenant-Colonels R. Caldwell and W. L. Reade. Majors E. C. Anderson and G. S. Crawford.

TRANSFERS.—Lieutenant-Colonel H. S. McGill, from Eastern Command to London District. Colonel G. W. Robinson, from Aldershot Army Corps to Eastern Command. Colonel H. Martin, from Eastern Command to Welsh and Midland Command. Colonel C. A. Webb, from Eastern Command to Irish Command. Colonel T. M. Corker, from Irish Command to Scottish Command. Colonel A. W. P. Inman, from India to Hong Kong. Surgeon-General W. S. Pratt, from India to Southern Command. Colonel A. E. J. Croly, from Scottish Command to Eastern Command. Lieutenant-Colonel R. H. Hall, from Irish Command to London District. Captain S. G. Butler, from Eastern Command to Aldershot. Captain H. S. Roch, from Aldershot to Ireland.

Colonels O. E. P. Lloyd, V.C., and R. H. Forman have been placed under orders for service in India.

Major C. H. Melville has been appointed Expert in Sanitation on the Advisory Board, Army Medical Services.

Captains E. W. Bliss and S. G. Butler have been appointed Specialists in Operative Surgery at Portsmouth and Aldershot respectively.

Captain J. Matthews has been appointed Specialist in Ophthalmology at Woolwich.

Captain H. C. R. Hime has been appointed to the Depôt, Royal Army Medical Corps, Aldershot.

Captain T. C. Mackenzie, D.S.O., and Lieutenant C. V. B. Stanley have been appointed to the Egyptian Army.

QUARTERMASTERS.

Honorary Captain J. Hirst has been promoted to the rank of Honorary Major.

Honorary Lieutenant A. Morrison arrived home from South Africa on February 8, 1906, in exchange with Honorary Lieutenant H. Spackman.

LIST OF CASUALTIES:—

Transfers from other Corps.—Nil.

Transfers to other Corps.—10086 Staff-Sergeant A. W. Holding, to Colonial Government, North Nigeria; 11214 Sergeant W. E. Squire, to Egyptian Army; 19793 Private D. Edman, to 5th Lancers; 52 Private W. H. Graham, to 21st Lancers; 53 Private R. Hippessen, to 21st Lancers; 19740 Private R. J. Gray, to Army Service Corps; 19872 Private W. F. Boother, to Royal Marine Light Infantry; 9 Private H. J. Uff, to Royal Engineers; 19940 Private J. Kelly, to 1st Battalion Leinster Regiment; 30 Private T. J. Friend, to 105th Battery, Royal Field Artillery.

Transfers to Army Reserve.—18246 Private J. Mellor, 12254 Private H. Le Riche, 18264 Private G. H. Murray, 11672 Private T. C. O'Connor, 18913 Private W. E. Stanley, 18238 Private A. T. Mangell, 18248 Private J. A Murphy, 18225 Private E. C. Mabbott, 18272 Private J. E. Merchant, 18271 Private F. C. Lucus, 18273 Private J. Brophy, 18265 Private F. Batchelor, 18279 Private A. G. Balls, 18282 Private J. Elder, 18283 Private T. O'Brien, 18292 Private C. W. Wicks, 18293 Private P. T. Hatton, 17205 Private H. Hall, 17206 Private A. Field, 18303 Private I. Wilkinson, 17037 Private G. Barnes, 18309 Private T. Pomci, 18320 Private W. Pope, 18314 Private C. H. Hawes, 18336 Private D. Matthews, 18334 Private A. Barclay, 18348 Private F. H. Nicholson, 18342 Private C. Cassidy, 18347 Private F. J. Chase, 18351 Private J. Hirst.

Discharges.—6358 Sergeant-Major H. H. Davidson, term of engagement; 6372 Sergeant-Major J. M. Power, term of engagement; 17063 Corporal A. R. Emery, term of engagement, A.O. 106; 17064 Private G. A. Kilminster, term of engagement, A.O. 106; 44 Private C. Bailey, purchase £10; 16490 Private H. J. Hunt, by special authority in Halifax, Nova Scotia; 18292 Private B. Finch, by special authority in Halifax, Nova Scotia; 98 Private H. Coles, purchase £10; 15637 Private H. Rice, medically unfit.

Disembarkations from Abroad.—Barbados to England, per s.s. "Trent," January 6 10127 Sergeant E. Lishmund.

Egypt to England, per s.s. "Silicia," January 22: 17205 Private H. Hall, 17206 Private A. Field.

Hong Kong to England, per s.s. "Dunera," January 30: 9990 Staff-Sergeant W. Wilson, 6859 Sergeant J. Walsh, 7768 Corporal L. Browne, 16825 Private R. Hefferman, 16577 Private J. Doughty, 16341 Private J. A. A. Fomachon, 15585 Private H. Latter, 16442 Private W. Lawson, 17280 Private A. Lindford, 16925 Private J. Norton, 16882 Private G. J. Short, 15737 Private A. E. Thompson, 18962 Private F. H. Morris.

Jamaica to England, per s.s. "Port Kingston," January 12: 10900 Sergeant A. E. Andrews.

Bermuda to England, per s.s. "Beta," January 26: 16264 Corporal W. Harper, 17125 Private M. Brockbank, 12209 Private A. Eccles.

Ceylon to England, per s.s. "Oruba," January 28: 4458 Sergeant-Major S. W. Sulley, 6795 Staff-Sergeant J. Currie, 7933 Corporal S. W. Barton, 15079 Private W. Rowson.

Gibraltar to England, per s.s. "Oruba," January 28: 6854 Sergeant-Major W. T. Spencer.

Singapore to England, per s.s. "Victoria," February 3: 6225 Sergeant-Major J. Clark, 8117 Quartermaster-Sergeant F. J. Taylor.

Singapore to England, per s.s. "Dunera," January 30: 16105 Private A. Bolland,

16197 Private A. Bolton, 17223 Private H. White, 8543 Private G. Thorogood, 3 Private W. J. Bradford.

Barbados to England, per s.s. "Tagus," Febuary 2: 18439 Corporal W. T. Leach, 17734 Private A. R. Cook.

South Africa to England, per s.s. "Dilwara," February 8; 7810 Sergeant-Major F. Cronin, 14369 Sergeant E. Newhouse, 11530 Sergeant T. J. Starkie, 9158 Sergeant W. Best, 9830 Sergeant H. Grossheim, 15721 Sergeant A. E. O'Dell, 11626 Sergeant H. J. Easy, 12443 Lance-Sergeant H. G. Burns, 11633 Corporal G. D. Glasson, 14434 Corporal T. D. Dobson, 11867 Corporal W. Wright, 14770 Corporal A. Buckner, 12926 Corporal A. D. Gordon, 12459 Corporal F. Poulton, 10661 Corporal G. H. Tempest, 13310 Lance-Corporal S. West, 15610 Lance-Corporal T. H. Griggs, 12650 Lance-Corporal G. Wyke, 13025 Lance-Corporal F. C. Bovey, 14355 Private W. G. Snell, 14289 Private A. Neill, 11092 Private A. Taylor, 13189 Private C. G. T. Clarke, 14209 Private A. McCune, 18968 Private A. J. Gibbling, 9993 Private R. G. Weatherhill, 17233 Private W. Lovatt, 14612 Private G. Marron, 14555 Private E. H. Liddell, 9884 Private L. M. Corbett, 12447 Private W. Reynolds, 14349 Private H. E. Aprill, 12356 Private W. Smith, 11872 Private R. Carley, 13032 Private H. J. Cheney, 12863 Private S. G. McGavin, 12562 Private G. P. Tuberville, 9973 Private G. W. Gatesman, 16108 Private J. Duncan, 16954 Private W. Moore.

Embarkation for Abroad.—14705 Sergeant W. A. Muishead, to Sierra Leone, January 20.

Permitted to Serve beyond Twenty-one Years.—6686 Sergeant-Major E. W. Newland, 6583 Quartermaster-Sergeant J. Carter, 7059 Quartermaster-Sergeant J. R. Shaw, 5372 Sergeant-Major A. C. Wren, permitted to complete twenty-five years.

Promotions.—6362 Sergeant H. S. Goodchild to be Staff-Sergeant in Royal Army Medical Corps Volunteers.

Examinations.

Qualified for Promotion, &c.

For Sergeant-Major.—6446 Sergeant-Major A. McNab.

For Quartermaster-Sergeant.—8772 Staff-Sergeant S. Stevens, 9006 Staff-Sergeant G. J. Smith.

For Staff-Sergeant.—9668 Sergeant G. Hurrell, 8367 Sergeant A. E. Ford.

For Sergeant.—9703 Sergeant W. B. Heponstall, 15808 Lance-Sergeant C. Primer, 17568 Lance-Sergeant E. Steele, 17260 Corporal G. W. Payne.

For Corporal.—18443 Private G. Harris, 18957 Private A. C. Smith, 17628 Private T. Luscombe, 19396 Private H. Baker, 12669 Private C. W. Grinham, 16110 Private J. Wellham, 17555 Private M. Kinder, 18571 Private F. J. Pepper, 18185 Private W. C. H. Mayo, 17358 Private C. Ennor, 17784 Private J. F. Stevens, 17319 Private A. T. Hart, 16266 Private R. S. Talbot, 16481 Private W. W. Bee, 17573 Private C. Harlen, 18902 Private W. Blundell.

As Compounders.—15437 Corporal C. A. Wilkinson, 15096 Corporal J. E. Pugh.

NOTES FROM NETLEY.—Lieutenant-Colonel G. E. Twiss, R.A.M.C., writes (February 15, 1906): "The final tie in the football competition for the 'Harwood' Cup was played on the 14th inst., at Aldershot, between No. 4 Company, Netley, and No. 3 Company, Alton, and a good game resulted in a win for the former by 2 goals to 1.

"*No. 4 Company Team.*

"Goal: Private Pilling. Backs: Lance-Corporal Lamkin, Corporal Worswick. Half-backs: Private McCormick, Lance-Corporal Edwards, Private Broomfield. Forwards: Privates McGuire and Cockburn (right wing), Private Hodgson (centre), Privates Sweeny and Mawbey (left wing).

"Referee: Quartermaster and Honorary Lieutenant A. Lunney.

"No. 4 Company's record in this competition: Beat No. 2 Company (Aldershot), 7 goals to 3; beat No. 18 Company (London), 6 goals to 0.

"Miss F. E. Addams Williams, R.R.C., Matron Q.A.I.M.N.S., has received orders to hold herself in readiness to embark for service in South Africa at an early date, in view of her being required to take over the appointment of Principal Matron."

NOTES FROM PORTSMOUTH.—Major R. J. Copeland, R.A.M.C., writes: "The Headquarters No. 6 Company, R.A.M.C., Portsmouth, was the scene of great festivity on the afternoon of February 6 (Twelfth Night), when the officers of the R.A.M.C. provided the families of No. 6 Company with a Christmas tree, preceded by a tea and conjuring entertainment. The proceedings went off with great *éclat*, and the afternoon

was voted a huge success. The wards were charmingly decorated by the nursing sisters, aided by the men, and bright-coloured paper-chains, flags and evergreens caught the eye in every direction. While tea was being administered to the excited little folk and their parents, Lieutenant-Colonels Harwood and Pechell were 'At Home' in the officers' library to the officers of the Corps in the Portsmouth District and their wives, the following being among those who were present: Colonel and Mrs. Morris, Colonel and Mrs. Maunsell, Colonel and Mrs. Thompson, Colonel and Mrs. Magrath, Colonel and Mrs. Winter, Colonel and Mrs. McWatters, Major and Mrs. Copeland, Major Connor, Captain Norrington, Captain and Mrs. Winkfield, and Dr. and Mrs. Hamilton. That ceremony concluded, an excellent conjuror, for upwards of an hour, kept one and all much amused with a capital performance of sleight of hand and hand-shadows, and well deserved the applause he gained.

"The Christmas tree which followed as the last item of the programme was presided over by Father Christmas, ably represented by Dr. Hamilton."

NOTES FROM BLOEMFONTEIN.—(January 6, 1906.) The detachment held their Annual Sports on January 3, and except that the temperature was 93° F. in the shade, the conditions were most favourable. The meeting was a great success, and the following extracts from the *Bloemfontein Post* may be of interest. Comic men were numerous, Private Brough as an Indian *tamasha-wala* being especially good. In the boxing competition the competitors collapsed into their chairs at "time," and were resuscitated by their seconds in the most approved manner.

"ROYAL ARMY MEDICAL CORPS SPORTS.

"By the kind permission of Lieutenant-Colonel E. J. E. Risk, C.O., the Royal Army Medical Corps Sports were held on Wednesday on ground closely adjoining the Military Hospital. Excellent weather prevailed during the day, and owing to the excellent work paid the ground by the Committee the competitors had nothing to complain of. The track was slightly uphill at the finish, but the times registered in the 100 and 220 yards showed that the Royal Army Medical Corps has possession of athletes who would, with a bit of training, hold their own with the best in the Colony. One of the great features of the day was the running of Edwards, who captured prize after prize, with Walton always being handy. The track was in good order considering the short time which the Committee had been given to get it prepared, and all the other arrangements were complete. The boxing could not be classed as being of a very high order, but what contests were got through were genuine, all the contestants putting their best in.

"The following were the officials who were responsible for such a successful meeting: President, Lieutenant-Colonel W. J. MacNamara, R.A.M.C.; Vice-President, Lieutenant-Colonel E. J. E. Risk, R.A.M.C.; Committee, Lieutenant J. T. McEntire, R.A.M.C., Civil-Surgeons J. E. Hannighan and A. U. Parkhurst; Sergeant J. Dunn, Lance-Corporals Bovey and Wyke, Privates Pollard, Cairns and Wilson; Secretary, Sergeant R. S. Nichol, R.A.M.C.; Starters, Majors S. F. Clark and H. J. Parry, R.A.M.C.; Timekeepers, Major A. B. Hinde, R.A.M.C., and Lieutenant T. S. Dudding, R.A.M.C.; Judges, Captain J. W. West, R.A.M.C., Lieutenant and Quartermaster A. Morrison, R.A.M.C., and Sergeant-Major W. Cooper, R.A.M.C.; Handicappers, Lieutenant Le Bas, R.A.M.C., and Sergeant R. S. Nichol, R.A.M.C.

"During the afternoon the band of the 1st Battalion Norfolk Regiment played under the conductorship of Bandmaster G. Dean.

"At the conclusion of the sports, Mrs. Risk, wife of the Commanding Officer of the Corps, very graciously consented to present the prizes to the respective winners. The following were the results: *Throwing Cricket Ball:* Private Livermore, 95 yards, 1; Private McDowell, 90 yards, 2. *Two Miles Flat:* Private Hawthorne, 1; Private Gray, 2; Private Ware, 3. Won asily. Time: 12 mins. 6 secs. *Long Jump:* Private Edwards, 19 feet, 1; Private Hawthorne, 2. *High Jump:* Private Colquohoun, 4 feet 9 inches, 1; Private Hawthorne, 2. *Potato Race:* Lance-Corporal Gaythorne, 1; Private McFarlane, 2; Private Stephens, 3, *Officers' Race:* Lieutenant Dudding, 1; Dr. Hannighan, 2. *One Mile Flat:* Private Cassell, 1; Private Holden, 2. Won easily. Time: 5 mins. 25 secs. *Boot Race:* Private Atkinson, 1; Private Hodgkins, 2. 100 *Yards Flat*: First Heat: Private Edwards, scratch, 1; Private Walton, 8 yards, 2. A great race; won by 2 yards. Time: $11\frac{2}{5}$ secs. Second Heat: Private Hawthorne, 4 yards, 1; Private Colquohoun, 3 yards, 2. Just won on the tape. Time: $11\frac{2}{5}$ secs. Final Heat: Private Walton 1; Private Edwards, 2. A great race. Won only by feet. Time: $11\frac{1}{5}$ secs. 200 *Yards Flat:* Private Edwards, 1; Private Walton, 2;

Lance-Corporal Gaythorne, 3. Won by 2 yards after a hard finish. Time: 26 secs. *Costume Race:* Private Steward (Kaffir Girl), 1; Private Page (Lidy), 2; Private Brough (Indian Juggler), 3. *Band Race:* Private Gowing, 1; Private Gilbert, 2; Private Lardent, 3. *One Mile Flat* (open to Garrison and S.A.C.): Private Wilkins, (1st Norfolk), 1; Private Smith (3rd Northumberland Fusiliers), 2; Private Emberson, (5th Dragoon Guards), 3. Time: 4 mins. 58 secs. *Sack Race:* Kavanagh, 1; Steward, 2; Holden, 3. 120 *Yards Hurdles:* Private Edwards, 1; Private Hawthorne, 2; Lance-Corporal Gaythorne, 3. Won comfortably by 8 yards. Time: 18 secs. *Three-legged Race:* Guinney and Swan, 1; McDonald and Castle, 2.

"*Boxing.* Semi-final. (Catch Weights.) Private Humphries defeated Private Cairns on points after a very hot three rounds. Light Weights (Final). In this contest a keen fight was put up between Private Hawthorne and Lance-Corporal Gaythorne, and in the second round the latter got knocked out by a severe left on the neck. Catch Weights (Final). In this Colquohoun beat Holden after a good go. There was very little science shown, but both were willing. In these contests Major Parry acted as referee, and Civil-Surgeon Parkhurst was judge.

440 *Yards Flat* (open to Royal Army Medical Corps in South Africa): Private Edwards, 1; Private Walton, 2. Time: 1 min. 1 sec.

"*Children's Race:* Master Wilson, 1; Master McCutcheon, 2; Master Ward, 3. Won by about 2 yards.

"*Obstacle Race:* Gowers, 1; Davis, 2; Cator, 3.

"Very amusing and caused roars of laughter owing to the tarpaulins being pressed down too tightly, and the contestants' struggles to crawl through were simply ridiculous.

"*Tug of War* (Final): The Medical Division pulled off the final against the Cooks, and won easily.

"*Consolation Race:* Private Gunning (5th Dragoon Guards); Private Emberson (5th Dragoon Guards); Private Lake (Northumberland Fusiliers)."

A private in the Northumberland Fusiliers is desirous of boxing Private Wilson, R.A.M.C., for £10 a side.

The Detachment Cricket Team is beginning to show itself, and has arranged fixtures with the other Corps in the Station. So far it has been beaten by the 1st Norfolks and by the Brigade of the Royal Field Artillery (twice)—one match was lost by four runs only. The team needs practice, and requires to learn to hold catches and to field. Private Colquohoun keeps wicket well, Private Rose is a very fair bowler, Private Walton can bat a bit, and Majors Hinde and Clark, with Lieutenant Le Bas, show distinct symptoms of having played the game before. Captain West and Lieutenant McEntire have also contributed runs, while Sergeant Dunn evinces a desire to find the boundary.

The Christmas festivities passed off very successfully, and included a smoking concert by the men, at which most of the officers were present, and a Christmas tree for the children.

Captains Goddard and West have gone home tour expired, while Lieutenant and Quartermaster Morrison has exchanged with Mr. Spackman. These officers were duly dined at mess, and their departure is regretted by their brother officers. Major Hinde has taken over charge of Naval Hill, where he is much troubled by the persistent efforts of a burglar to raid the house. Firearms are kept handy in all the bungalows. Major Clark has been transferred from Cape Colony as Sanitary Officer, Orange River Colony and Natal.

The whole cantonment is pulling itself together in expectation of an early visit from H.R.H. the Duke of Connaught.

NOTES FROM CALCUTTA, INDIA.—Captain E. Blake Knox, R.A.M.C., Secretary to the Principal Medical Officer, H.M. Forces in India, writes (January 18, 1906):—

"*Appointments.*—Captain H. E. M. Douglas, V.C., D.S.O., to be Sanitary Officer, Army Headquarters, India, sub. *pro. tem.*, *vice* Major C. H. Melville, transferred to the Home Establishment.

"Major T. W. Gibbard is appointed a Specialist in Ophthalmology and posted to Rawal Pindi.

"Lieutenant-Colonel J. Carmichael to the command of Station Hospital, Jullundur, sub. *pro. tem.*, *vice* Lieutenant-Colonel R. Kirkpatrick, C.M.G., proceeding home, tour expired. Lieutenant-Colonel F. H. Treherne to the officiating command of Station Hospital, Rawal Pindi, *vice* Lieutenant-Colonel D. O'Sullivan, officiating as Principal Medical Officer, Abbottabad and Sialkote Brigades. Lieutenant-Colonel E. Davis to the officiating command of Station Hospital, Nowshera, *vice* Lieutenant-Colonel Tre-

herne, transferred to Rawal Pindi. Lieutenant M. C. Wetherell to the command of Station Hospital, Attock, *vice* Lieutenant C. A. J. A. Balck, vacated.

"*Postings.*—The undermentioned officers nominated for duty in India have been posted to the stations noted against their names: "Lieutenant-Colonel B. T. McCreery, Bangalore. Lieutenant-Colonel G. Cree, Wellington. Lieutenant-Colonel J. M. F. Shine, Deesa. Major H. A. Hinge, Mhow. Lieutenant L. V. Thurston, Mhow. Lieutenant H. J. Crossley, Calcutta. Lieutenant R. H. L. Cordner, nominated for duty in India, is posted to Rawal Pindi.

"*Transfers.*—Colonel J. I. Routh and Lieutenant W. C. Rivers to the temporary half-pay list. Colonel W. S. Pratt, M.B., V.H.S., to the Home Establishment on promotion. Major C. H. Melville, to the Home Establishment on appointment to the War Office. Lieutenant T. S. Coates, from the 8th (Poona) Division to the 5th (Mhow) Division. Colonel J. F. Williamson, M.B., C.B., C.M.G., Principal Medical Officer, Jubbulpore and Jhansi Brigades, is transferred in the same capacity to the 5th (Mhow) Division.

"*Leave.*—Major W. S. Downman, six months from February 1, 1906, out of India, pending retirement. Lieutenant-Colonel H. J. Barratt, seven months from March 28, 1906, out of India. Lieutenant-Colonel A. S. Rose, eight months, from April 1, 1906, out of India.

"*Embarkations.*—The following officers sailed for England, tour expired, December 9, 1905: Major J. Hennessy, Captains W. L. Baker, F. M. Parry and B. R. Dinnis. December 30, 1905: Captains F. W. Cotton, W. Bennett and F. MacLennan. January 10, 1906: Majors C. H. Melville and W. C. Poole, Captains A. E. Hamerton, D.S.O., J. M. Cuthbert and A. F. Weston. January 26, 1906: Lieutenant-Colonel R. Kirkpatrick, C.M.G., Captains E. P. Sewell and C. H. Straton."

NOTES FROM THE CURRAGH.—Captain F. E. Gunter, R.A.M.C., writes (February 9, 1906): "The following changes have taken place within the last two months:—

"*Departures.*—Captain L. Humphry (Company Officer) to R.A.M. College; Lieutenant G. G. Tabuteau to Bombay; Captain Tichborne, R.A.M.C.(M.), to Dublin.

"*Arrivals.*—Lieutenant-Colonel F. A. B. Daly, C.B. (in command Military Hospital), Captain A. E. Weld (in charge Military Families' Hospital), Lieutenants C. E. W. S. Fawcett, T. B. Moriarty, A. E. T. Hastings, G. W. W. Ware, F. C. Sampson, C. F. White, M. Keane, and T. S. Blackwell.

"*Officers Quarters.*—The large hut next the officers' mess has been obtained, by the kindness of the General Officer Commanding, as single officers' quarters, and provides much needed and convenient accommodation.

"*Football.*—The Company Team, although weakened by the loss of several of its best players, in consequence of their transfer to the Army Reserve, is again showing good form. Since the New Year five matches have been played, showing a result of 3 wins, 1 draw, and 1 loss, a very creditable display taking into consideration the superior numerical strength of the units of opponents.

"*Boxing.*—Private W. C. H. Mayo upheld the credit of the Corps by winning a six-round contest at the last tournament of the 11th Hussars here. He meets Private Berry, 11th Hussars (Feather-weight Champion Army and Navy, 1905), in a ten-round contest, at a tournament of the 19th Hussars, to be held on February 23. Private T. Wilson, another aspirant to pugilistic honours, is also down to meet Private Crilly, 6th Dragoons (Light-weight Champion of Ireland), in a contest at the same tournament."

NOTES FROM HONG KONG.—Captain J. T. Johnson, R.A.M.C., writes (December 26, 1905): "We are now having very pleasant cool weather in Hong Kong and it ought to last till about the middle of March. In the evenings it is quite cold enough for fires.

"The transport 'Dunera' arrived on December 13, with the following R.A.M.C. details on board: Major T. P. Jones, wife and child; Lieutenant C. Ryley and wife; Lieutenant A. T. Frost, and sixteen N.C.O.'s and men for a tour of service in Hong Kong; also Major Brogden and Lieutenant A. N. Fraser, *en route* for Wei-hai-Wei. The 'Dunera' sailed again on December 22 for England, *via* Singapore and Colombo, with Captains F. W. Lambelle, E. V. Aylen and W. J. S. Harvey, and twelve N.C.O.'s and men, R.A.M.C., tour expired, and a large number of invalids. Captain B. A. Craig also left, tour expired, for England, *via* Calcutta, on December 20, with Indian invalids.

"On December 11 the Annual Christmas Tea was given to the children of the

Detachment; this passed off very pleasantly, largely owing to the efforts of Mrs. Lambelle, Mrs. Harvey and Mrs. Wilson, who have taken a great interest in the young people.

"On December 17 the officers, R.A.M.C., dined together at the Hong Kong Club. This is the first time for some years that the whole of the officers on the station have dined together; nine were able to be present: Lieutenant-Colonel C. L. Josling, R.A.M.C. (occupied the chair), Lieutenant-Colonel C. S. Sparkes, Major T. P. Jones, Captains Johnson, Aylen, Harvey and Craig, and Lieutenants Ryley and Frost. A most agreeable evening was spent and an opportunity offered to say farewell to the tour expired, and welcome the new arrivals. It is proposed to make this an annual event.

"On Christmas Day the barrack-room of the Detachment was very tastefully decorated with flags and bunting, and an arrangement of flowers and plants. The Detachment have taken a lot of trouble over these decorations, and the general effect was quite up to, if not better than, that of previous years. Lieutenant-Colonel Josling, R.A.M.C., our genial Senior Medical Officer, and acting Principal Medical Officer, and officers R.A.M.C., visited the Detachment at dinner, and the Principal Medical Officer addressed the men in a few well-chosen sentences. Sergeant-Major Hutton suitably responded for the Detachment, which is at present an exceedingly good one, well conducted, keen on their work, and useful at games. In the afternoon a tea was given to the convalescent patients in a hospital ward, which was very neatly decorated. In the evening the Detachment, R.A.M.C., held a smoking concert, which was largely attended, and was a suitable conclusion to a Christmas Day spent on foreign service at our most distant Far Eastern Station.

"*Cricket.*—This year, owing to the Corps being a little deficient of expert 'Wielders of the Willow,' we have combined with the Army Service Corps and Army Ordnance Department to form an Army Staff cricket team for the Hong Kong League shield. Result up to date: Matches played 6, won 4, lost 2. Captain Harvey and Staff Sergeant Wilson will be much missed among the departures. The former has made some useful scores; 22, 11, 53, and 42, in consecutive matches. Of the new arrivals, Corporal Steele, R.A.M.C., shows good form, though others may be as yet 'hiding their light under a bushel.'

"*Football* (Association).—In this branch of sport the Detachment are doing very well, and quite holding their own with the rest of the garrison. Up-to-date results as follow: Matches played 7, won 4, lost 2, drawn 1.

"Our new hospital is rapidly nearing completion. It will, however, be six months or more before we move into it, as the orderlies' quarters have only just been started. In connection with the hospital a scheme for medical officers' quarters and sisters' quarters on a liberal scale has been drawn up but not finally approved. When these are built it will add much to the value of Hong Kong as a station for our Corps. At present, owing to scarcity of houses, high rentals, and increasing cost of food, the expense of living on this station is very considerable, especially for married officers."

NOTES FROM NAIROBI, EAST AFRICA.—Quartermaster-Sergeant R. Stanley, R.A.M.C., writes (January 7, 1906):—

"CHRISTMAS ON THE SHORES OF LAKE VICTORIA NYANZA.

"Had it not been for certain lamentable events I might perhaps have spent Christmas, 1905, with comrades of the Corps at home; however, having been destined to spend the Yuletide otherwise, and on the tropical shores of Lake Victoria Nyanza, this proved a unique experience not likely to fall to the lot of many of the Corps. It is my intention only to give a partial description of the country as seen from the Uganda Railway, in the hope that it may prove interesting to rank and file readers of the Journal. Having obtained permission from Major Will, Principal Medical Officer, Uganda and East Africa, to proceed on four days' leave of absence, I journeyed by rail from Nairobi to Port Florence on the Nyanza. The railway line from Nairobi to Fort Ternan (257 miles) passes through some very fine landscape and lake scenery, and this stretch of country is in no way unhealthy. From the latter place, however, on to the great lake (48 miles), the country is swampy and malarial, and unsuited for permanent residence by white people. The healthy stretch of country is dotted with the farmsteads of white settlers, and as the land is rich and fertile, yielding two crops a year, the possibilities of agriculture would appear to be very promising and remunerative at no very distant date. The grass huts of the natives also dot the country, and the dusky figures of men and women may be seen busy tilling and attending to their shambas and grazing their herds and flocks. The country, generally speaking, is

mountainous, and a good view of the crater of the extinct volcano of Longanott is seen from the train near Naivasha. At Naivasha and Nakuru there are large lakes, and game in abundance may be seen by their banks. The railway line from Kikuyu to Escarpment Station passes through tracts of evergreen forest, which has its own peculiar and special charms, and the wooded and green lofty mountain immediately behind Escarpment station is very picturesque. Owing to the mountainous nature of the country the train glides slowly round the sloping sides of many mountains, over yawning ravines, and through many valleys and plains. At Gilgil steam may be seen oozing from hot underground springs. The last 25 miles stretch of journey to the Lake is inhabited by the Kavorando tribe, which, judging from the number of native huts, appears to be a very numerous one. This tribe is remarkable, inasmuch as the men and women are absolutely naked, and strangely enough are noted for their morality and freedom from specific diseases when compared with other tribes that partially clothe themselves. After twenty-one hours' railway journey the wonderful lake is reached, and naturally one's mind is given to contemplation and admiration for those early explorers who, in their day, had to traverse every inch of country from the coast inland, 584 miles, by caravan, before they reached this vast expanse of water. Personally, I did not see much of the lake and its borders, as to go round it by steamer and call at all its ports occupies a fortnight. The train runs on to a pier in the Gulf of Kavorando—an arm of the lake which from the pier to its mouth is some 40 miles—and here the s.s. 'Sybil,' a superbly fitted little steamer, capable of carrying about twelve first-class passengers and 200 tons of cargo, besides a large number of deck passengers, was moored alongside, and natives were busy loading cargo. The contrast of the steamer and the native dhows and paddling canoes in the same waters was remarkable. The hills surrounding the gulf are sparsely wooded, but are covered with vegetation, presenting a refreshing and pleasing landscape to the eye. The swampy border of the lake here is thickly infested with mosquitoes, and crocodiles and hippopotami are numerous in the waters. Heavy tropical rains, accompanied by very frequent thunder and lightning, fell during the two evenings I spent at Port Florence, and the days were excessively hot. We were rewarded on Christmas evening by one of the most magnificent sunsets it had ever been our good luck to witness, and it is very doubtful if even the most able brush of Turner could have transferred this glorious scene with its varying shades of light and colour to canvas. The railway dak bungalow provided shelter and food and an excellent Christmas fare (by pre-arrangement), which a party of four Britishers heartily partook of at 8 p.m. on Christmas evening, within a stone's throw from the water's edge of the great lake, and only 5 miles south of the Equator."

NOTES FROM PRETORIA, SOUTH AFRICA.—Major H. J. M. Buist, D.S.O., R.A.M.C., writes (January 4, 1906): "The following changes of station, &c., have taken place in this Command during the month of December, 1905.

"*Change of Station.*—Lieutenant-Colonel S. Hickson, Wynberg to Harrismith.

"*Arrival.*—" Lieutenant and Quartermaster H. Spackman, R.A.M.C., arrived from England, in exchange with Lieutenant and Quartermaster A. Morrison, R.A.M.C., and was posted to Bloemfontein for duty."

QUEEN ALEXANDRA'S IMPERIAL MILITARY NURSING SERVICE.

The following ladies have received appointments as Staff Nurses: Miss M. E. Brewer, Miss M. Darvill, Miss M. G. Fisher, Miss A. E. Harvey.

Postings and Transfers Abroad.—Sisters: Miss C. K. E. Steel, to Wynberg, Cape Colony, from Harrismith; Miss M. Kendal, to Wynberg, Cape Colony, on arrival from England; Miss K. Bearse, to Standerton, Transvaal, on arrival from England; Miss J. E. Dods, from Queen Alexandra Military Hospital, Millbank, S.W., to Military Hospital, Gosport; Miss Mackay, from Queen Alexandra Military Hospital, Millbank, to Military Hospital, Gosport; Miss S. Smyth, from Cambridge Hospital, Aldershot, to s.s. "Plassy," for Indian Troopship duty. Staff Nurse: Miss E. M. Fairchild, from Royal Victoria Hospital, Netley, to s.s. "Plassy," for Indian Troopship duty. Miss A. B. Cameron, from Wynberg, Cape Colony, to England, on expiration of tour abroad.

Postings and Transfers at Home.—Sisters: Miss J. Hoadley, R.R.C., to Cambridge Hospital, Aldershot, on return from South Africa; Miss F. M. Hodgins, to Connaught Hospital, Aldershot, on return from South Africa; Miss S. I. Snowdon, to Military

Hospital, Dover, on return from South Africa; Miss M. Worthington. to Military Hospital, Colchester, on return from Egypt. Staff Nurse: Miss M. G. Fisher, to Royal Victoria Hospital, Netley, on appointment.

Promotions.—The undermentioned Sisters to be Matrons: Miss H. McCurdy, Miss L. W. Tulloh, R.R.C.

Appointments Confirmed.—Staff Nurses: Miss A. Ayre, Miss M. Brown, Miss M. Davis, Miss H. B. Derby, Miss C. D. E. F. Dunn, Miss M. C. Johnston, Miss E. K. Kaberry, Miss M. L. Kaberry, Miss C. G. Lees, Miss M. L. Macartney, Miss A. C. Mowat, Miss A. A. Steer, Miss M. B. Williams.

ARMY MEDICAL RESERVE OF OFFICERS.

Surgeon-Captain John M. Moir, M.D., to be Surgeon-Major, dated January 13, 1906.

Surgeon-Lieutenant Algernon E. L. Wear, M.D., to be Surgeon-Captain, dated January 16, 1906.

ROYAL ARMY MEDICAL CORPS (MILITIA).

Denis Murphy, Gent., to be Lieutenant, dated January 24, 1906.

ROYAL ARMY MEDICAL CORPS (VOLUNTEERS).

Northern Command: Leeds Companies.—James Boswell, Gent., to be Quartermaster, with the honorary rank of Lieutenant, dated February 7, 1906.

Scottish Command: Glasgow Companies.—James Kenny, Gent., to be Quartermaster, with the honorary rank of Lieutenant, dated February 7, 1906.

Welsh Bearer Company.—Henry Thomas Samuel, Gent., to be Lieutenant, dated February 10, 1906.

OTHER VOLUNTEER CORPS.

1*st Midlothian Royal Garrison Artillery (Volunteers).*—The undermentioned officers resign their Commissions: Surgeon-Captain A. A. S. Skirving, C.M.G., M.B., dated January 24, 1906. Surgeon-Captain (Honorary Lieutenant in the Army) W. M. Taylor, M.B., dated January 24, 1906.

3*rd (Cambridgeshire) Volunteer Battalion the Suffolk Regiment.*—Supernumerary Surgeon-Captain F. E. A. Webb is absorbed into the Establishment, dated November 1, 1905.

2*nd Volunteer Battalion the East Yorkshire Regiment.*—Surgeon-Captain (Major, Volunteers, retired) J. Chestnutt is granted the honorary rank of Surgeon-Major, dated January 24, 1906.

2*nd Volunteer Battalion the South Staffordshire Regiment.*—The undermentioned gentlemen to be Surgeon-Lieutenants: Charles John Caddick, dated January 24, 1906. Thomas Hutchinson, dated January 24, 1906.

5*th (Glasgow Highland) Volunteer Battalion the Highland Light Infantry.*—Supernumerary Surgeon-Major Q. Chalmers (Brigade-Surgeon-Lieutenant-Colonel, Senior Medical Officer, Highland Light Infantry Volunteer Infantry Brigade) to be Surgeon-Lieutenant-Colonel, remaining supernumerary, dated January 24, 1906.

4*th (Stirlingshire) Volunteer Battalion Princess Louise's (Argyll and Sutherland Highlanders).*—Peter McFadyen, M.B., to be Surgeon-Lieutenant, dated January 24, 1906.

The Highland Royal Garrison Artillery (Volunteers).—Surgeon-Lieutenant R. Crerar, M.B., is removed from the Volunteer Force for failing to fulfil the prescribed conditions for efficiency, dated January 12, 1906.

3*rd Middlesex Royal Garrison Artillery (Volunteers).*—Surgeon-Major J. I. Palmer resigns his Commission, with permission to retain his rank and to wear the prescribed uniform, dated January 15, 1906.

6th Volunteer Battalion the Royal Scots (Lothian Regiment).—Surgeon-Lieutenant C. B. Gunn, M.D., to be Surgeon-Captain, dated February 7, 1906.

2nd Volunteer Battalion the Royal Sussex Regiment.—Supernumerary Surgeon-Captain (Honorary Captain in the Army) G. Black, M.B., is absorbed into the Establishment, dated January 17, 1906.

1st West Riding of Yorkshire Royal Garrison Artillery (Volunteers). Surgeon-Major J. Rumboll resigns his Commission, with permission to retain his rank and to wear the prescribed uniform, dated February 10, 1906.

1st Durham Royal Engineers (Volunteers).—David Henderson Weir, M.D., to be Surgeon-Lieutenant, dated February 10, 1906.

1st Volunteer Battalion the Royal Scots Fusiliers. Surgeon-Lieutenant-Colonel W. Sneddon, M.D., is granted the honorary rank of Surgeon-Colonel, dated February 10, 1906.

Surgeon-Lieutenant-Colonel and Honorary Surgeon-Colonel W. Sneddon, M.D., resigns his Commission, with permission to retain his rank and to wear the prescribed uniform, dated February 10, 1906.

ROYAL ARMY MEDICAL COLLEGE.

The following copies of Examination Papers are published for information:—

EXAMINATION OF CAPTAINS, ROYAL ARMY MEDICAL CORPS, FOR PROMOTION TO MAJOR.

Medicine.—(Written.) January 19, 1906. Commencing 2.30 p.m. (Time allowed: Three hours.)

(1) Describe, in detail, the methods of physical examination by which enlargement of the spleen can be made out, and indicate the chief diseases with which such enlargement is associated, giving a few of the salient features of each.

(2) Distinguish dysentery from other diseases characterised by diarrhœa. What is its causation, and its treatment, preventive and curative?

(3) Discuss the etiology of acute rheumatic fever.

(4) Enumerate the chief varieties of disease of the nervous system due to syphilis, indicate which are and which are not responsive to treatment, and explain their difference in reaction.

(5) Differentiate scurvy from other diseases with which it may be confounded, and discuss its occurrence in armies in the field.

(6) Give the differential diagnosis of diphtheria from scarlet fever. How would you treat (i.) an individual case; (ii.) an epidemic in barracks?

Surgery.—(Written.) January 20, 1906. From 10 a.m. to 1 p.m. (N.B.—The two last questions (5) and (6) are to be answered in a separate book from that in which the other questions are answered.)

(1) Describe the chief symptoms which may be met with in a case of inherited syphilis, stating at what period of life they are usually met with.

(2) For what conditions is nephrectomy indicated?
Describe the chief varieties of this operation.
What accidents or complications may occur during or after its performance?

(3) Describe fully the operation you would adopt for radical cure of an oblique inguinal hernia in a young man.
Mention the principal points of after-treatment.

(4) Discuss the causation, symptoms, and treatment of complete separation of the lower epiphysis of the femur.

(5) (*a*) Describe fully the treatment you would adopt in a case of perforating gunshot wound of the cranium.
(*b*) What complications may arise during the after-treatment of the case, and how should each be met?

(6) What are the forms of arterio-venous communications met with as the result of wounds by the modern rifle bullet?
Describe how they are produced, give their symptoms, and discuss their treatment.

Refraction and Skiagraphy.—(Written.) (As part of the Examination in Surgery.) January 23, 1906. From 10 a.m. to 12 noon.

(1) (*a*) Describe briefly the method of taking stereoscopic skiagrams.

(*b*) What are the methods by which stereoscopic negatives and prints may be viewed?

(*c*) What advantages are there in taking stereoscopic skiagrams?

(2) In working an X-ray tube from a spark coil, what precautions must be taken to avoid injury to the patient and to the operator?

(3) How can you ascertain whether an accumulator requires recharging? What is a suitable strength of current for recharging an accumulator of 30 ampère-hours' capacity, and how can you tell when it is fully charged?

(4) What is hypermetropia, to what causes may it be due, and to what symptoms may it give rise?

(5) How is the vision of recruits tested? What acuteness of vision, as measured by Snellen's test types, is required to pass this test? Can a myopic person pass this test, and, if so, with what degree of myopia?

List of Subjects for Essays. January 19, 1906. Commencing 10 a.m. (Time allowed: Three hours.) (N.B.—One subject only to be selected.)

(1) Discussion of the pathology and differential diagnosis of headache, persistent or frequently repeated.

(2) The general methods and value of an examination of the contents of the stomach.

(3) The treatment in all stages of acute anterior poliomyelitis in the child or adult.

(4) Discussion of the conditions requiring tracheotomy, from the point of view (*a*) of the nature of the disease; (*b*) of the amount of obstruction.

(5) The probable causes and differential diagnosis of a case of remittent pyrexia, which has already lasted twelve days.

(6) The differential diagnosis of appendicitis, and the conditions requiring operation.

(7) The symptoms and treatment of fracture of the spine.

(8) Obstruction of the common bile duct.

(9) Suppuration in the accessory sinuses of the nose.

(10) Simple fractures in the neighbourhood of or involving joints.

(11) Pulsating tumours of the orbit.

(12) Varicose veins, their significance and treatment.

Examination for Commissions in the Royal Army Medical Corps.

Medicine.—(Case for commentary.) January 26, 1906. Commencing 11.30 a.m. (Time allowed: One hour and a half.) Read your instructions.

A gentleman travelling for a few weeks in a sub-tropical country became subject to a slight diarrhœa. As it was never bad enough to interfere with his progress, he did not lay up, but it clung to him, and persisted even on his return home, so that the bowels still acted twice or thrice daily. No blood was noticed in the stools, nor was there colic nor tenesmus. The stools were not then seen by a medical man. The general health was scarcely impaired, if at all.

At this stage, in very bitterly cold weather, he was seized by pain in the right side, of a typically pleuritic character. On examination friction was plainly heard over a small area at the base of the right lung; and either then or soon afterwards, a finger-breadth or two of dulness appeared in the same part. There was a moderate fever; and, as the state of the bowels had scarcely been mentioned, the case was regarded as an attack of pleurisy, or perhaps, of pleuro-pneumonia, of very limited extent, and no very grave significance.

In two or three days, however, it appeared that without any notable extension of of the local signs the general condition was becoming seriously impaired; moreover the temperature, though not excessive, began to exhibit rather a hectic type. The dis-

quieting features were increasing weakness, great loss of flesh, and a sallowness amounting to a shade of jaundice. The diarrhœa persisted as before; the stools were loose fæcal matter, containing some mucus. They were not microscopically examined.

To add to the gravity of the condition, the liver—within a few hours, certainly not more than twenty-four hours, of the previous physical examination—became palpable below the ribs to a marked extent, say, for two or three inches. But it was of normal form and consistence, and wholly free from tenderness. The thoracic signs remained as before: those of a narrowly limited exudation, with an occasional friction sound at its upper border.

The aid of the surgeon was now obtained and, after exploration in the dull area, an opening was made, and a large outpouring of "matter" took place; this, in the occupation of the moment, was thrown away, so that no expert opinion on its nature was possible.

The operation was followed by considerable relief, but the respite was only temporary, and in two or three days death ensued from exhaustion.

The preceding case, and the operative method, are to be fully discussed; but a precise diagnosis is not expected.

Surgery.—(Case for commentary.) January 26, 1906. Commencing 10 a.m. (Time allowed: One hour and a half.) Read your instructions.

In October, 1903, a man, aged 33, was struck on the left side of his head by a falling plank. He was unconscious for twenty-seven hours. No surface signs of cranial damage could be made out. He left the hospital, after a stay of five weeks, fairly well, only a spot of tenderness over the left parietal bone remained.

After several weeks he was again admitted, having developed the following symptoms: Insomnia, general weakness, frontal headaches, dizziness, very frequent vomiting, and night-sweats. His pulse and temperature were normal. Under treatment, by rest and bromides, the vomiting promptly ceased, and the headache and sleeplessness were so much better that he left the hospital in three weeks.

Relapses occurred at short intervals during the ensuing eight months, and tremor and muscular feebleness, without atrophy, appeared in the right arm and leg. By the autumn of 1904 this almost amounted to right hemiplegia, and he was unable to stand or walk.

In October, 1904, on rising from a chair, he had a fit. He fell, and was quite unconscious, his eyes twisted up towards the left; twitchings, commencing in the right arm and leg, soon became universal, and involved the left side and face. This was followed by a stupor lasting two to three hours. He had no warning sensation before the fit. These fits occurred daily for six to eight weeks, and to a great extent replaced the headache and vomiting of the former time. He was unwilling to submit to operation. Gradually the fits lessened, and so much improvement in the hemiplegic symptoms followed that he became able to stand and walk. His right knee from this time worked stiffly, and with much noisy intra-articular crackling. His teeth, previously good, underwent rapid decay, and he had nine of them extracted during the next year.

His present condition, January, 1906, is as follows: He has a constant vertical headache; there has been no vomiting for one month, and no fit for seven weeks; he eats and sleeps well; no spot of cranial tenderness or inequality can be found; there are no mental symptoms; his hearing and vision are good; there are no oculo-motor nor facial symptoms, the left pupil is slightly larger than the right, and the left disc shows slight hyperæmia.

The tremor has disappeared, he walks fairly well for one to two miles without assistance or staff, merely dragging the right foot a little. The knee-jerks are exaggerated; there is no clonus, no atrophy, no muscular contractures. The arm has recovered so well that he can write a long letter in excellent handwriting; there is no tremor, and the sensation over the whole of the body is perfect.

There are no urinary symptoms, and his pulse and temperature are normal.

Analyse these symptoms, and explain, after a review of the whole history, what lesion has occurred.

What treatment would you propose at the present time?

Give the prognosis (*a*) without operation, (*b*) with operation.

DEPÔT, ROYAL ARMY MEDICAL CORPS.

EXAMINATION OF LIEUTENANTS (ON PROBATION), ROYAL ARMY MEDICAL CORPS.

Hospital Administration.—(Time allowed: Two hours.)

(1) What are the different entries made on a sick report by the Medical Officer, under the heading Medical Officers' remarks?

(2) Sketch briefly the duties of a Medical Officer as Sanitary Officer of a regiment.

(3) Describe generally how you would examine a recruit as to his physical fitness for enlistment.

(4) Enumerate the various diets which may be ordered for a soldier sick in hospital.

(5) What are the regulations affecting the disposal of the valuables of patients admitted to hospital?

Military Law.—(Time allowed: Two hours.)

(1) A non-commissioned officer is sentenced to imprisonment by the civil power. What steps does his Commanding Officer take?

(2) State the forfeiture of pay in the following cases of absences without leave:—

(*a*) From 10 a.m., June 1, to 6 p.m., June 1.
(*b*) From 8 p.m., June 2, to 3 a.m., June 3.
(*c*) From 10 p.m., June 3, to 3 a.m., June 4.
(*d*) From 10 p.m., June 4, to 2 am., June 5.
(*e*) From 10 a.m., June 5, to 12.10 p.m., June 5.

(3) State fully the punishment which is entailed in an award of seven days' C.B.

(4) State precisely how the following awards are entered in the Defaulter Sheets and Guard Reports:—

(*a*) Seven days' confinement to barracks.
(*b*) Six days' imprisonment with hard labour.
(*c*) Nine days' imprisonment without hard labour.
(*d*) A seven shillings and sixpenny fine for a third case of drunkenness.

(5) What are the different kinds of Courts-Martial? What is the composition of a District Court-Martial?

Ambulance Drill and Work.—(Time allowed: Two hours.)

(1) Give the detail for "changing numbers" at stretcher drill.

(2) Give the detail for laying out the pegs preparatory to raising the Field Hospital marquee.

(3) What instructions would you give to men about to occupy a standing camp with a view to maintaining good sanitation in and about the tents?

(4) A Medical Officer goes into action in medical charge of a regiment; how should he deal with casuaities occurring during the action?

(5) How are those incapacitated by sickness or wounds disposed of on active service?

Squad and Company Drill.—(Time allowed: Two hours.)

(1) A company is turned about in fours; give the detail for "About Turn."

(2) Give the detail when a company is marching in fours to a flank for "On the Right—Form Company."

(3) A company is moving to the right in fours and has been inclined to the left. Give the detail for "Left Incline."

(4) A company in line has been formed up into company column on the right; what are the positions of the various Commanders?

(5) A company advancing in company column on the right has been turned to the right; give all the words of command for forming up the company into line.

Interior Economy.—(Time allowed: Two hours.)

(1) Explain briefly what is meant by "The Consolidated Stoppage Account."

(2) Enumerate the articles of personal clothing, and state when they are issued.

(3) What are the powers of a Company Officer?

(4) What are the rates of Corps pay for the Royal Army Medical Corps, and state the full emoluments of a private of eight years' service of good character?

(5) What do you mean by the terms "Regimental Entry" and "Company Entry"? Give examples.

WARREN TRIENNIAL PRIZE.

MASSACHUSETTS GENERAL HOSPITAL.

THE *Warren Triennial Prize* was founded by the late Dr. J. Mason Warren in memory of his father, and his will provides that the accumulated interest of the fund shall be awarded every three years to the best dissertation, considered worthy of a premium, on some subject in Physiology, Surgery, or Pathological Anatomy; the arbitrators being the Physicians and Surgeons of the Massachusetts General Hospital.

The subject for competition for the year 1907 is on *Some Special Subject in Physiology, Surgery, or Pathology.*

Dissertations must be legibly written, and must be suitably bound, so as to be easily handled. The name of the writer must be enclosed in a sealed envelope, on which must be written a motto corresponding with one on the accompanying dissertation.

Any clue given by the dissertation, or any action on the part of the writer which reveals his name before the award of the prize, will disqualify him from receiving the same.

The amount of the prize for the year 1907 will be $500.

In case no dissertation is considered sufficiently meritorious, no award will be made.

Dissertations will be received until April 14, 1907.

A high value will be placed on original work.

HERBERT B. HOWARD,
Resident Physician.

Boston, February, 1906.

THE CORPS QUALIFICATION OF COMPOUNDER OF MEDICINES.

LIEUTENANT-COLONEL E. M. WILSON, C.B., C.M.G., D.S.O., R.A.M.C. (R.P.), writes: "It is believed that some uncertainty exists as to the exact legal status of Warrant and Non-Commissioned Officers and men possessing the qualification of Compounder of Medicines conferred by the Director-General after examination in accordance with the Regulations laid down in the Standing Orders, Royal Army Medical Corps, and it has been suggested that a statement regarding the present position, as defined by various official decisions, would be of interest to all readers of the Journal, especially to those who have obtained, or who intend to obtain, the qualification with a view to employment as dispensers on their return to civil life. In the first place, it is most important that the limitations of the qualification should be clearly understood to prevent subsequent disappointment and probable loss. The possession of this certificate does *not* entitle a man to keep open shop or dispense poisons in accordance with the provisions of the Pharmacy Acts of 1868 and 1898, or to assume or use the title 'Chemist or Druggist' in any part of *Great Britain.* This Act does not extend to Ireland, but it is probable that similar legislation exists in that country, and no compounder of the Royal Army Medical Corps should attempt to practise in the sister isle on the strength of this certificate without first obtaining a legal opinion. Any one contravening this law in *Great Britain* is liable to a penalty of £5, and I have known this enforced

against an ex-soldier of the Corps who was keeping a chemist's shop, although, no doubt, he was acting in perfect good faith and believed himself to be qualified.

"The certificate is accepted by the Local Government Board as qualifying for the appointment of dispenser to dispensaries provided for certain unions, parishes and districts in England and Wales, named in Schedules A and B of the Order dated June 7, 1895, and it is also accepted by the Local Government Board for Ireland in similar positions, *i.e.*, as Compounders of Medicines of a dispensary district by the Order dated October 21, 1905. In this latter Order the proviso is laid down that the man must have been *registered* at the *date of his discharge* from the Army, and that before such date he had performed the duties of Compounder of Medicine for not less than four years.

"Our Compounders are also eligible for appointment as dispensers in the Royal Ordnance Factories by a letter from the Civil Service Commissioners, dated February 24, 1904, and we have now pensioners filling these posts at Woolwich and Pimlico, and also in the Hospital in the Military Prison at Dover.

"In the Dispensary attached to the works of the Great Western Railway Company at Swindon we have several Compounders, and the following extract from a letter just received from the Principal Medical Officer there will be read with interest:—

"'I am pleased to say that Sergeant-Major Whitcher and the other five men you kindly sent us are still in our employment, and we should be sorry to lose any of them. Should we at any time require a dispenser, you may be sure we should ask you to select one, if you would be kind enough to do so.' I think that it will be agreed that this is a most satisfactory report.

"N.C.O.'s serving on their army engagement, but supernumerary to the Corps, are also employed at the Royal Hibernian Military School and at Kilmainham. We also occasionally receive applications from medical men practising in the country, who require dispensers and book-keepers, which we are glad to transmit to reliable N.C.O.'s whose names are registered in the Record Office, Aldershot.

"It will thus be seen that, within certain limitations, our certificate is of considerable value in assisting our N.C.O.'s to obtain suitable employment in civil life, and it is hoped that the publication of this short notice in the Journal may induce a large number of N.O.C.'s and men to avail themselves of their opportunities of qualifying during their Colour service. At the same time, it will be readily understood that it is necessary to maintain a high standard of efficiency in order to ensure that the certificate is only granted to men who possess a thoroughly sound and practical knowledge of the subject. For this reason the Director-General has retained the granting of the certificate in his own hands, and each set of papers, after being checked by Officers Commanding, and in this Office, are submitted to him for decision.

"In conclusion, a few words may not be out of place as to the importance to N.C.O.'s of qualifying as Compounders as regards their future career *while in the Army*. The Certificate is essential in order to obtain promotion beyond the rank of Sergeant, and also for employment under the Colonial Office. We have at the present time several N.C.O.'s serving as supernumerary to the Corps, in important and well-paid appointments in East and West Africa, as well as in Egypt. The number of these appointments seems to be gradually increasing, and we are always glad to submit the names of suitable men whenever an opportunity occurs, but they must be *good compounders*, as they are often employed in responsible and isolated positions. We prefer also to select N.C.O.'s possessing this qualification for appointment as instructors to the Auxillary Forces. Apart from the fact that they ought to be able to impart instruction in this subject, it is probable that very few Militia or Volunteer N.C.O.'s possess any knowledge of dispensing, and in the event of embodiment or mobilisation of these companies it is to the Sergeant-Instructors of our own Corps that we should have to look for the performance of these important duties."

MILITARY WEDDING AT YORK.

MUCH interest was manifested in a military wedding which took place on Thursday, January 18, at St. Mary's Church, Castlegate, York, both the bride, Miss Alice E. Tait, daughter of the late Sir Peter Tait, of Limerick, and the bridegroom, Lieutenant-Colonel I. Bomford Emerson, R.A.M.C., Deer Park, King's County, being well known locally. Colonel Emerson is the Officer Commanding No. 8 Company, R.A.M.C., and the Military Hospital in this garrison. A guard of honour was furnished by the Headquarter detachment of No. 8 Company, R.A.M.C., who lined the aisle of the church, and the Nursing Staff, Q.A.I.M.N.S., were also present in uniform. Colonel Emerson, who was attended by Major O'Donnell, R.A.M.C., was in uniform, and the majority of the military guests were also present in uniform, giving a very brilliant aspect to the ceremony. The officiating clergy were the Rev. H. Little, M.A., Chaplain to the Forces, N.C., assisted by the Vicar (the Rev. W. O. F. Campbell). The bride, who was given away by her brother-in-law, Mr. James Bryan, of Beckenham, was attended by her sister, Miss Evelyn Tait, as bridesmaid. She was dressed in cream satin, draped with Maltese lace, and wore a pearl and diamond pendant, the gift of the bridegroom. After the ceremony Lady Tait held a reception at the Governor's House, York Castle, kindly lent by Colonel and Mrs. Johnstone. During the reception music was supplied by the excellent string band of the 18th Hussars. Among those who received invitations and were present were the Dean of York and Lady Emma Purey-Cust, Lieutenant-General Sir H. Leslie and Lady Rundle, Brigadier-General and Mrs. Mends, Colonel H. S. Marling, V.C., and Mrs. Marling, Colonel and Mrs. Johnstone, Colonel and Mrs. Scholes, Colonel and Mrs. O'Connell, Colonel and Mrs. Westcott, Colonel and Mrs. Tuckey, Major and Mrs. Penton, Major and Mrs. Faichnie, Major O'Donnell, Colonel and the Hon. Mrs. Eason Wilkinson, Miss Milner, Sir Robert and Lady Dalrymple, Colonel Lloyd, V.C., Miss Milson, and many others. Subsequently, Colonel and Mrs. Emerson left for London *en route* for Italy. The presents were very numerous and choice, and included a silver rose bowl from the officers, R.A.M.C., Northern Command.

ROYAL MASONIC INSTITUTION FOR BOYS.

ELECTION, APRIL, 1906.

THE votes and interest of the Patrons, Presidents, Governors, Subscribers, &c., of the Institution are earnestly solicited on behalf of Henry Percy Mackinnon, aged 9, son of the late Brother Lieutenant-Colonel H. W. A. Mackinnon, D.S.O., R.A.M.C., who died March 24, 1905, leaving his widow and two children (a girl, aged 10, in addition to the above-named), almost totally unprovided for.

The widow's sole means of support is the interest on £250 invested at 4 per cent.

The widow and children are ineligible for pension or compassionate allowance from Army funds, owing to disparity of age between Mrs. Mackinnon and her late husband, although they had been married twelve years.

Brother Mackinnon was initiated in St. John the Evangelist Lodge, No. 1483, Punjab, in March, 1874; was a member of St. John and St. Paul Lodge, No. 349, Malta, from 1877 to 1880 (served as J.W.); was a member of Pentangle Lodge, Chatham, from 1881 to 1883; was latterly for some years a member of Army and Navy Lodge, Aldershot, No. 1971.

In the Royal Artillery he belonged to Chapters 349, 407 and 782.

In the Mark, he had been a member of Lodges Nos. 107, 248 (W.M. and Founder), 311 (Founder).

In K.T. was a member of St. George's (P.P.), and St. Michael's Preceptories (Founder).

In A. and A. Rite had taken 18°, and had been a member of Rose of Sharon and Rose and Lily Chapters.

The case is strongly recommended by the Provincial Grand Lodge of Hampshire and the Isle of Wight; the Deputy Master and Brethren Aldershot Army and Navy Lodge, No. 1971; the Worshipful Master and Brethren Household Brigade Lodge, No. 2614; the Deputy Master and Brethren Nil Sine Labore Lodge, No. 2736; Right Worshipful Brethren Right Hon. the Earl of Euston, Prov. G.M. North. and Hunt.; Brigade-Surgeon J. Balfour Cockburn, M.D., Prov. G.M. Guernsey and Alderney; Sir Augustus F. W. E. Webster, Bart., Prov. G.M. Hants and Isle of Wight; Right Hon. the Earl of Onslow, G.C.M.G., P. Prov. G.M. Surrey; Field-Marshal the Right Hon. Earl Roberts, V.C., K.P., G.C.B., &c., &c , Past Grand Warden: Very Worshipful Brother Sir Edward Letchworth, Grand Secretary, Vice-Patron and Past Treasurer; Worthy Brethren Major J. E. Le Feuvre, V.D., P.G.D., P. Dep. Prov. G.M. Hants and Isle of Wight; Arthur H. Bowles, P.G.D., W.M. Astolat Lodge, No. 2858; P.M. Wey Side Lodge, No. 1395; Dr. John H. Salter, P.G.D., Dep. Prov. G.M. Essex; Lieutenant Colonel H. Grier, R.A.M.C., P.G.D.; Colonel Sir James Clark, Bart., C.B.; Edgar Figgess, P.G. Std. B., P.M. Tuscan Lodge, No. 14; George J. Fowler, P.M. Iris Lodge, No. 2545; Brigadier-General Francis Lloyd, C.B., D.S.O., Dep. Master Lodge No. 1971; Colonel Charles J. Blake, R.A., P.M. St. John and St. Paul Lodge, No. 349; Colonel Robert G. Gordon-Gilmour, C.B., M.V.O., D.S.O., P.M. Household Brigade Lodge, No. 2614; Colonel H. E. R. James, Com. R.A.M. Coll.; J. G. Pilcher, J.P., D.L.; G. Crawford Thomson, M.D., W.M. Cheselden Lodge, No. 2870; Captain W. Lyons, P. Prov. G.D., P.M. Aldershot Camp Lodge, No. 1331; the Rev. Bernard Harvey, W.M. Hertford Lodge, No. 403; Lieutenant-Colonel H. W. Morrieson, R.A., P.M. Centurion Lodge, No. 1718; Colonel F. W. B. Landon, C.B., P.D.M. Nil Sine Labore Lodge, No. 2736; Lieutenant-Colonel J. G. Harwood, P.M., P.D.G.M. Bengal; the Rev. C. Rushbrook Nunn, P.P.G.C. Cheshire, and by Worthy Brother Major H. Pidcock-Henzell, P.M., P. Prov. G.W., J.P., Pinehurst, Farnboro', Hants, by whom proxies will be thankfully received.

Officers may, perhaps, be able to render assistance in this case by giving votes, or by securing the support of friends who may have votes for the Royal Masonic Institution. The case is strongly recommended, and is one of special urgency. Communications in this matter should be addressed to Major T. McCulloch, R.A.M.C., 68, Victoria Street, S.W.

THE ROYAL ARMY MEDICAL CORPS FUND.

Notice of Fourth General Meeting.

The Fourth General Meeting of Subscribers to this Fund will be held in the Theatre of the Royal United Service Institution on Monday, June 18, 1906, at 3 p.m. The Director-General will preside.

It is hoped that officers will freely express their views on any points connected with the Fund which they may wish discussed. Those officers who wish for information on any special point are asked to communicate with the Hon. Secretary, Lieutenant-Colonel Skinner, at 68, Victoria Street, S.W., in order that facts and figures may be furnished in response to any question asked.

LIST OF SUCCESSFUL CANDIDATES FOR ROYAL ARMY MEDICAL CORPS COMMISSIONS.

No. of Marks	Names	Medical School	Qualifications, &c.
595	Drew, Charles Milligan..	Glasgow University..	M.A., M.B., B.Ch.Glas.
585	Sutcliffe, Archibald Alfred	St.Thomas's Hospital	M.B., B.S.Lond., M.R.C.S. Eng., L.R.C.P.Lond.
584	Cummins, Arthur Gordon	Queen's College, Cork	M.B., B.Ch.R.U.Irel.
577	Millard, Alfred Sutton ..	Edinburgh University	M.B., B.Ch., B.Sc.Edin.
573	Gotelee, Hugh Evelyn ..	St.Thomas's Hospital	M.R.C.S.Eng., L.R.C.P.Lond.
568	Littlejohns, Archib. Smith	Guy's Hospital ..	M.R.C.S.Eng., L.R.C.P.Lond., B.A.Cantab.
558	McCammon, Frank Alexander	Queen's College, Belfast	M.B., B.Ch.R.U.Irel.
548	Galwey, William Rickards	Trinity Coll., Dublin	M.B., B.Ch., B.A.Dubl.
543	Archibald, Robert George	Edinburgh University	M.B., B.Ch.Edin.
541	De la Cour, George ..	University Coll. Hosp.	M.R.C.S.Eng., L.R.C.P.Lond.
536	Egan, William	Catholic Univ., Dublin	M.B., B.Ch.R.U.Irel.
535	Forrest, Frank	Victoria University, Manchester	M.R.C.S.Eng., L.R.C.P.Lond.
535	Sexton, Timothy William Octavius	Middlesex Hospital..	M.R.C.S.Eng., L.R.C.P.Lond.
534	Tate, Robert Geo. Hetherington	Trinity College, Dublin	M.D., B.Ch., D.P.H., B.A. Dublin.
532	Williams, Augustus Scott	St. Bart.'s Hospital..	M.R.C.S.Eng., L.R.C.P.Lond.
515	Dawson, Alexander ..	Marischal College, Aberdeen	M.B., B.Ch.Aberd.
514	Edmunds, Clive Thornley	St. Mary's Hospital	M.R.C.S.Eng., L.R.C.P.Lond.
513	Johnson, Valentine Goode	,, ,, ,,	M.R.C.S.Eng., L.R.C.P.Lond.
513	Paine, Ernest Wm. Mynall	St. Bart.'s Hospital..	M.R.C.S.Eng., L.R.C.P.Lond.
511	Porteous, Edward John..	Edinburgh University	M.B., B.Ch.Edin.
509	O'Neill, Edward Michael	Catholic Univ., Dublin	M.B., B.Ch.R.U.Irel.
507	Honeybourne, Victor Cyril	St. Thomas's Hospital	M.R.C.S.Eng., L.R.C.P.Lond., B.A.Cantab.
504	Hingston, James Clarence Ledeatt	Middlesex Hospital..	M.R.C.S.Eng., L.R.C.P.Lond.
501	Edwards, George Bennicke	London Hospital ..	M.R.C.S.Eng., L.R.C.P.Lond.
501	Howell, Frederick Duke Gwynne	St.Thomas's Hospital	M.R.C.S.Eng., L.R.C.P.Lond.
499	Morris, Charles Reade Munroe	Trinity Coll., Dublin	M.B., B.Ch.Dubl.
499	Sampson, Patrick ..	Queen's College, Cork	L.R.C.P. & S.Irel.
498	Gillatt, William Harold	Glasgow University..	M.B., B.Ch.Glas.
498	Scott, John Walter Lennox	Westminster Hospital	M.R.C.S.Eng., L.R.C.P.Lond.
498	Smales, William Clayton	King's Coll. Hospital	M.R.C.S.Eng., L.R.C.P.Lond.
496	Mulligan, John Browne Grogan	Queen's Coll., Belfast	L.R.C.P. & S.Edin., L.F.P. & S.Glas.
494	Bond, Arthur Herbert ..	St. Mary's Hospital..	M.R.C.S.Eng., L.R.C.P.Lond.
494	Dill, Marcus Graham ..	Edinburgh University	M.B., B.Ch.Edin.
492	Newman, Richard Ernest Upton	,, ,,	M.B., B.Ch.Edin.
489	Jacques, Harold	London Hospital ..	L.S.A.Lond.
484	O'Grady, Donald de Courcy	Dublin	L.R.C.P. & S.Irel.
484	Robinson, Thomas Trevor Hull	Trinity Coll., Dublin	M.B., B.Ch.Dubl.
483	Leslie, Thomas Christie Cyprus	Dublin	L.R.C.P. & S.Irel.
480	Gibson, Lawrence George	London Hospital ..	M.R.C.S.Eng., L.R.C.P.Lond.
475	Stewart, Philip Smyly ..	Trinity Coll., Dublin	M.B., B.Ch.Dubl.

REGISTER FOR INDIAN SERVANTS.

Few officers on going to India have not experienced the difficulty of getting good servants. The discomforts on arrival and of a long journey up country, unprovided with a bearer, or, what is worse, provided with a hastily selected man, taken haphazard from the crowd of indifferent or bad characters who congregate in Bombay, have fallen to the lot of most of us; whilst the period of trial and vexation, until a proper staff of servants is secured, is familiar to us all.

In our Corps, with regular annual reliefs, it should not be difficult to arrange for an interchange. Officers leaving India would then be able to provide places for the good and tried retainers they are relinquishing, and new arrivals would, by taking on these men, be spared many of the worries and troubles which now befall them. Further, good servants would not be lost to the Corps, and the prospects of continuous employment could not fail to have attraction for the better class of men.

With these ends in view, officers due home from India are requested to communicate to the Journal particulars of servants whom they can recommend, so that officers going out in relief may have an opportunity of securing these men. The particulars required are:—

(1) Class of servant.
(2) Whether for bachelor or married officer.
(3) District or station to which he belongs.
(4) Any special recommendations.

Note.—The date the officer leaves India should also be stated, and when and where the servant will be available.

The following are particulars of a bearer lately employed by Major G. T. Rawnsley, R.A.M.C., Sierra Leone:—

(1) Bearer.
(2) For bachelor.
(3) Rawal Pindi, Punjab.
(4) A good servant, is very honest, takes care of clothes, &c., well. Is a Mahommedan. Speaks English. Will do Khitmagar's work as well. Was with Major Rawnsley five years, and previously five years with No. 3 Mountain Battery, Royal Garrison Artillery, and has excellent "chits."
(5) Name and address, Mardan Ali, Bearer, c/o Sheik Molid Yosin, Mers Baboo, 2nd Battalion Royal Irish Fusiliers, Rawal Pindi, Punjab, India.
(6) The servant writes he is available now.

OBITUARY.

Lieutenant-Colonel H. W. Hubbard.

Probably there are few announcements in this column which will be read with more universal regret than that of the death of Lieutenant-Colonel Hubbard, which occurred at Gründelwald, on January 26, from double pneumonia. Among his friends—and all who knew him will claim that title—he will perhaps be best remembered by his absolute straightforwardness and his cheery sense of humour. Educated at St. George's Hospital, he passed second in his batch, and was gazetted July 30, 1881.

From Aldershot he proceeded to Egypt in 1882, was present at the battle of Tel-el-Kebir, and received the medal and clasp and bronze star. Subsequently he served at Chatham, Malta, Dinapore and elsewhere, and eventually again at Aldershot, in charge of the Cambridge Hospital. Wherever stationed he had hosts of friends.

Possessed of sound judgment and a healthy mind, he appeared always naturally disposed to make the best of things, and to believe the best of the men with whom he came in contact: and this happy optimism, combined with tact, not only carried him through situations which might otherwise have been difficult, but ensured the loyal assistance of those with whom he worked. All officers naturally did their best with a man who was always ready to help, and to do his own share, and something over.

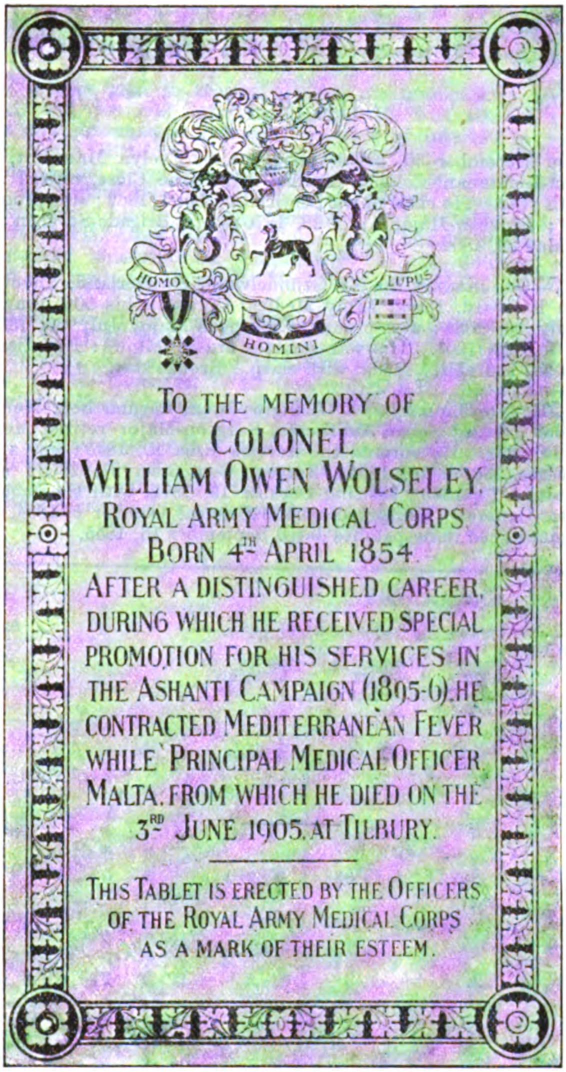
The remark was made only a day or two ago to the present writer: "One always felt somehow that he would help if one were in trouble," and many readers of this notice will acknowledge that it rightly expresses Hubbard's character.

An honest, kind-hearted gentleman and a capable officer, he was a good type of the Royal Army Medical Corps, and his untimely death is a loss not only to his many personal friends but to the Corps at large.

It will be a satisfaction to his friends to know that he was attended to the last by an old friend and fellow-student, with whom he was travelling on a brief holiday.

THE LATE COLONEL W. O. WOLSELEY, R.A.M.C.

The following is a photograph of the Memorial Brass erected by the Officers of the Corps.



BIRTHS.

HARRISON.—At Sialkot, Punjab, on January 4, 1906, the wife of Captain L. W. Harrison, R.A.M.C., of a son.

WATTS.—On December 25, 1905, at 25, Warwick Mansions, Cromwell Crescent, Kensington, S.W., the wife of Captain Brian Watts, R.A.M.C., of a daughter.

DEATHS.

CLOSE.—On December 30, at his residence, 5, Evelyn Mansions, Westminster, Brigade-Surgeon-Lieutenant-Colonel Charles Stratherne Close, retired Army Medical Staff, in his 69th year. He entered the Service October 1, 1862; was promoted Surgeon March 1, 1873; Surgeon-Major April 28, 1876; and Brigade-Surgeon December 21, 1887; retiring May 29, 1892.

HUBBARD.—On January 26, at Gründelwald, Switzerland, Lieutenant-Colonel Henry William Hubbard, Royal Army Medical Corps, in his 50th year. He entered the Service July 30, 1881; was promoted Surgeon-Major July 30, 1893, and Lieutenant-Colonel July 30, 1901. His war services are as follows: Egyptian Expedition, 1882; Battle of Tel-el-Kebir. Medal with clasp. Bronze star.

PROTHEROE.—On January 9, at Llanglwydwen, Carmarthen, Honorary Deputy Inspector-General Edward Schaw Protheroe, Surgeon-Major retired Medical Department, in his 83rd year. He entered the Service June 10, 1845; was appointed Staff Surgeon, 2nd Class, March 16, 1855; Surgeon September 21, 1855; and promoted Surgeon-Major June 10, 1865; retiring October 19, 1872, with the honorary rank of Deputy Inspector-General. He served in the Crimea, October 5, 1854, to March 12, 1856, and was mentioned in despatches dated Septembr 16, 1855.

NOTICE TO SUBSCRIBERS.

Officers are particularly requested to give timely notice of changes of station or changes of address, in order to ensure the posting of the Journal to its correct destination.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, &c. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts and commands at home and abroad. All these communications should be written upon one side of the paper only, they should by preference be typewritten, but, if not, all proper names should be written in capital letters (or printed) to avoid mistakes, and be addressed to the Editor, Journal of the Royal Army Medical Corps, 68, Victoria Street, London, S.W.

Letters regarding subscriptions, non-delivery of the Journal, or change of address, should be sent to Major T. McCulloch, R.A.M.C., 68, Victoria Street, London, S.W.

Communications have been received from Lieutenant-Colonels R. H. Firth, W. G. Macpherson, C.M.G., J. R. Forrest, W. B. Leishman, E. M. Wilson, D.S.O., C.M.G., R.A.M.C. (R.P.), J. E. Nicholson (R.P.); Majors C. G. Spencer, C. E. G. Stalkartt, E. C. Freeman, W. H. Horrocks, T. H. Goodwin, D.S.O., W. J. Trotter; Captains H. W. Grattan, E. W. Cochrane, W. E. Hudleston, J. Crawford Kennedy, F. J. Palmer, C. H. Carr, W. A. Ward, F. F. Carroll; Lieutenants J. G. Bell, K. H. Reed, E. M. Glanvill; Sergeant-Major R. J. Allwork; Quartermaster-Sergeant R. Stanley.

In the event of reprints of articles being required by the authors, notification of such must be sent when submitting the papers. Reprints may be obtained at the following rates, and other reprints at proportionate rates:—

Number of Reprints	Number of Pages	Cost			Extra for Covers: As Journal, Printed on Front		As Journal, Plain, Unprinted		Cheaper Paper, Printed on Front		Cheaper Paper, Plain, Unprinted	
		£	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
12	4	0	2	6								
	8	0	4	6	3	6	0	11	3	2	0	7
	16	0	7	6								
25	4	0	3	0								
	8	0	5	6	4	0	1	3	3	6	0	9
	16	0	9	6								
50	4	0	4	0								
	8	0	6	9	5	0	1	9	4	0	1	0
	16	0	12	0								
100	4	0	5	6								
	8	0	9	0	6	6	3	3	5	6	2	
	16	0	16	9								
200	4	0	8	6								
	8	0	13	6	9	0	6	3	7	6	4	0
	16	1	3	6								

Cases for Binding Volumes.—Strong and useful cases for binding can be obtained from the publishers at the undermentioned rates:—

Covers, 1s. 4*d*. net; binding. 1s. 2*d*.
These charges are exclusive of cost of Postage.

In forwarding parts for binding the name and address of sender should be enclosed in parcel.

The following periodicals have been received: *The Medical Record, The Medical News, New York Medical Journal, American Medicine, Gazette Med. de Paris, Archives de Medicine et de Pharmacie Militaires, Il Morgagni, Gazetta Medico-Italiana, The Medical Review, El Siglo Medico, Der Militärärzt, Deutsche Militärärztliche Zeitschrift, Anales de Sanidad Militar, Revue Med. de la Suisse Romande, La Medicina Militar Espanola, The Boston Medical and Surgical Journal, Annali di Med. Navale, Giornale del Regio Esercito, Le Caducée, The Hospital, The Ophthalmoscope, St. Thomas's Hospital Gazette, Bulletin de l'Acad. de Med. de Paris, Arch. Med. Belges, Voyenno Medisinskii, The Indian Medical Gazette, The Australasian Medical Gazette, Journal of the Association of Military Surgeons, U.S., Militärlaegen ungwet af Militärlaegeforeningen, i Kjobenhavn, The Veterinary Journal, The Practitioner, Public Health, Medical Review, The Army and Navy Gazette, The United Service Gazette, Journal of the Royal United Service Institution, The Johns Hopkins Press, The Health Resort and Journal of Spas and Sanatoria, Journal of the Royal Sanitary Institute, Journal of the U.S. Institution of India, Indian Public Health, Bulletin de l'Institut Pasteur, Records of the School of Medicine, Cairo.*

We desire to remind members who have not paid their third year's subscription, which was due on July 1, 1905, that it is very important that such should be promptly paid.

NOTICE.

The Corps News is now printed as an inset to the Journal and separate copies may be subscribed for, price 2d. monthly.

JOURNAL

OF THE

ROYAL ARMY MEDICAL CORPS.

Corps News.

April, 1906.

ARMY MEDICAL SERVICE.—GAZETTE NOTIFICATIONS.

Lieutenant-Colonel William G. Macpherson, C.M.G., M.B., Royal Army Medical Corps, to be a Deputy-Assistant Director-General (attached to the Department of the Director of Military Operations), dated December 29, 1905.

ROYAL ARMY MEDICAL CORPS.

Lieutenant Charles V. B. Stanley, M.D., is seconded for service with the Egyptian Army, dated January 26, 1906.

The undermentioned Lieutenants are confirmed in that rank: William Byam, Herbert St. M. Carter, M.D., George W. Heron, John M. B. Rahilly, M.B., John A. Anderson, M.B., Hugh G. Sherren, Henry H. A. Emerson, M.B., Rowland P. Lewis, James H. Graham, M.B., Wallace Benson, M.B., George E. Ferguson, Charles E. W. S. Fawcett, M.B., Alexander M. Rose, M.B., Griffith H. Rees, M.B., Thomas Scatchard, Vivian H. Symons, Edward G. Anthonisz, Ronald A. Bryden, Edward L. Moss, Arthur E. S. Irvine, Thomas B. Moriarty, Michael B. H. Ritchie, M.B., Walter J. Weston, Albert E. F. Hastings, Mortimer J. Cromie, James S. Dunne, Edmund T. Potts, M.D., George W. W. Ware, M.B., William McConaghy, M.B., Wilfrid C. Nimmo, Michael Keane, Charles F. White, M.B., Francis C. Sampson, M.B., Thomas S. Blackwell, Harold E. Priestley, Philip J. Marett, Arthur D. O'Carroll, M.B., Alan C. Vidal, Hugh Stewart, M.B.

The undermentioned gentlemen to be Lieutenants, on probation, dated January 30, 1906: Charles Milligan Drew, M.B., Archibald Alfred Sutcliff, M.B., Arthur Gordon Cumming, M.B., Arthur Sutton Millard, M.B, Hugh Evelyn Gotelee, Archibald Smith Littlejohns, Frank Alexander McCammon, M.B., William Rickards Galwey, M.B., Robert George Archibald, M.B., George De la Cour, William Egan, M B., Frank Forrest, Timothy William Octavius Sexton, Robert George Hetherington Tate, M.D., Augustus Scott Williams, Alexander Dawson, M.B., Clive Thornley Edmunds, Valentine Goode Johnson, Ernest William Mynall Paine, Edward John Porteous, M.B., Edward Michael O'Neill, M.B., Victor Cyril Honeybourne, James Clarence Ledeatt Hingston, Georgie Bennicke Edwards, Frederick Duke Gwynne Howell, Charles Reade Monroe Morris, M.B., Patrick Sampson, William Harold Gillatt, M.B., John Walter Lennox Scott, William Clayton Smales, John Browne Grogan Mulligan, Arthur Herbert Bond, Marcus Graham Dill, M.B., Richard Ernest Upton Newman, M.B., Harold Jacques, Donald De Courcey O'Grady, Thomas Trevor Hull Robinson, M.B., Thomas Christie Cyprus Leslie, Lawrence George Gibson, Philip Smyly Stewart, M.B.

The undermentioned Lieutenants to be seconded under the provisions of Article 349, Pay Warrant, dated January 30, 1906: Hugh E. Gotelee, George De la Cour, Augustus S. Williams, Valentine G. Johnson, John W. L. Scott.

Major Hubert A. Bray, from the seconded list, to be Major, dated February 14, 1906.

The undermentioned Majors to be Lieutenant-Colonels, dated, January 30, 1906: Michael T. Yarr, F.R.C.S.I., Charles H. Melville, M.B., Bernard L. Mills, M.D., F.R.C.S.Edin., Horace Cocks, M.B., James B. Wilson, M.D., John Kearney, M.D., Frederick W. G. Hall, M.B., Arthur Kennedy, Henry P. G. Elkington, John B. W. Buchanan, M.B., Henry M. Adamson, M.B., Tudor G. Lavie, Harry H. Brown, M.B., Thomas H. Corkery, James J. O'Donnell, M.B.

Lieutenant-Colonel John Kearney, M.D., retires on retired pay, dated March 14, 1906. He entered the service January 30, 1886, was promoted Surgeon-Major January 30, 1898, and Lieutenant-Colonel, January 30, 1906. His war services are as follows: South African War, 1899-1902. Defence of Ladysmith, including sorties of December 7 and 10, 1899, and action of January 6, 1900. Operations in the Transvaal, east of Pretoria, including actions at Belfast (August 26 and 27). Operations in the Transvaal, January to December, 1901. Operations in Orange River Colony, January to April, 1902. Queen's medal with four clasps, King's medal with two clasps.

ROYAL HORSE GUARDS.

Surgeon-Major Hugh Rayner, M.B., to be Surgeon-Lieutenant-Colonel, dated January 30, 1906.

Surgeon-Lieutenant-Colonel Hugh Rayner, M.B., retires on retired pay, dated February 17, 1906. He entered the service January 30, 1886, and was appointed Surgeon, Grenadier Guards, April 14, 1886, and Surgeon-Captain, Royal Horse Guards, February 13, 1897. He was promoted Surgeon-Major June 19, 1900, and Surgeon-Lieutenant-Colonel January 30, 1906.

Surgeon-Captain Basil Pares, from 1st Life Guards, to be Surgeon-Major, *vice* Surgeon-Lieutenant-Colonel H. Rayner, M.B., retired, dated February 17, 1906.

ARRIVALS HOME.—From India: Surgeon-General W. S. Pratt; Lieutenant-Colonels R. Kirkpatrick, C.M.G., and S. Townsend; Captains A. C. Adderley, F. P. Lauder, C. H. Straton and E. P. Sewell. From Gibraltar: Major E. E. Powell. From Hong Kong: Captain B. A. Craig. From Barbados: Captains S. M. Adye-Curran and A. W. A. Irwin.

ARRIVALS HOME ON LEAVE.—From India: Lieutenant-Colonel W. T. Swan; Captains D. E. Curme, T. J. Potter, W. M. B. Sparkes, and Lieutenant G. E. Cathcart. From Malta: Lieutenant-Colonel J. M. Nicolls.

EMBARKATIONS.—For India: Lieutenant-Colonels J. R. Stuart and J. Meek; Lieutenants J. E. Hoar and W. S. Nealor. For West Africa: Captain J. Cowan. For Mauritius: Lieutenant R. J. B. Buchanan.

POSTINGS.—Surgeon-General W. S. Pratt, Lieutenant-Colonel G. J. Coates, Captains A. R. C. Parsons and H. B. G. Walton, to Southern Command. Lieutenant-Colonel R. Kirkpatrick, C.M.G., to Lichfield. Lieutenant-Colonel S. Townsend to Dover. Major E. E. Powell to Aldershot Army Corps. Captain E. P. Sewell to London District. Captain C. H. Straton to Eastern Command. Captain F. P. Lauder to Scottish Command. Captains A. C. Adderley and R. M. Skinner to Northern Command. Captains S. M. Adye-Curran, B. A. Craig, A. W. A. Irwin and R. N. Woodley, to Irish Command.

TRANSFER.—Lieutenant-Colonel R. H. Firth from London District to Aldershot Army Corps.

RETIRED PAY POST.—Major J. P. S. Hayes appointed to Gravesend.

DIPLOMAS.—Lieutenant J. W. S. Seccombe has obtained the D.P.H., R.C.S. England. Lieutenants R. J. B. Buchanan and C. W. Holden have obtained the D.P.H., R.C.S. Ireland.

SPECIALIST.—Major H. I. Pocock has been appointed Specialist in Dental Surgery in the Aldershot Command.

LIST OF CASUALTIES:—

Transfers from other Corps.—17901 Sergeant G. P. Jones, from Colonial Government, Northern Nigeria; 129 Private R. Willson, from Lancashire Fusiliers; 18996 Private A. Biggs, from 1st Dragoon Guards; 147 Private W. Lintott, from Royal Sussex

Regiment; 148 Private T. H. Allbeusy, from Royal Field Artillery; 149 Private H. N. Coote, from 17th Lancers; 160 Private V. Pettit, from Essex Regiment; 168 Private T. J. Watkins, from Duke of Cornwall's Light Infantry.

Transfers to other Corps.—17283 Corporal D. Bullock, to No. 1 Aldershot Company R.A.M.C. Militia; 19967 Private J. W. Brown, to Royal Welsh Fusiliers; 81 Private P. Dodge, to Somerset Light Infantry; 17422 Private H. Windwood, to Suffolk Regiment; 17813 Private H. Davies, to 2nd Battalion "The Buffs."

Transfers to Army Reserve.—14612 Private G. Marron, 17799 Private C. S. Brown, 18398 Private W. J. Lynn, 12345 Private A. Coppen, 18390 Private H. J. Matthews, 18399 Private W. G. Harding, 18401 Private J. T. Goodall, 11713 Private T. McKee, 17109 Private J. Acton, 18412 Private J. Clarkson, 18426 Private G. Williams, 18429 Private G. R. Foss, 17609 Private T. H. Evans, 18459 Private V. Daniel, 18436 Private W. S. Collins, 18449 Private H. Conroy, 18481 Private S. Elliot.

Rejoined from Army Reserve.—17422 Private H. W. Windwood.

Promotions.—7877 Quartermaster-Sergeant E. Kirk to be Sergeant-Major, January 10, 1906, *vice* Davidson discharged; 7848 Quartermaster-Sergeant W. Henfrey to be Sergeant-Major, January 31, 1906, *vice* Power, discharged; 6760 Quartermaster-Sergeant J. F. Ford to be Sergeant-Major, March 3, 1906, *vice* Cronin, discharged; 6001 Sergeant G. Ellison to be Staff-Sergeant under Para. 1866, King's Regulations, February 17, 1906; 17283 Corporal D. Bullock to be Sergeant on being posted as Instructor to No. 1 Aldershot Company, R.A.M.C. Militia, March 6, 1906.

Deaths.—3944 Staff-Sergeant C. Connor died at Aldershot on February 17, of chronic Bright's disease; 19166 Private M. Hayward died at Wynberg, Cape Colony, of enteric fever, on January 20, 1906; 10858 Private W. Cox died at Edinburgh, of pneumonia, on March 9, 1906.

Discharges.—7810 Sergeant-Major F. Cronin, termination of second period; 4458 Sergeant-Major S. Sully, termination of second period; 4745 Sergeant-Major W. Cooper, termination of second period; 16380 Quartermaster-Sergeant F. E. Thurgate, termination of second period; 6795 Staff-Sergeant J. Currie, termination of second period; 7768 Corporal L. Browne, after eighteen years; 11075 Corporal T. L. Wodhams, after thirteen years; 16319 Lance-Corporal G. Burnett, on payment of £25; 16956 Lance-Corporal H. H. Powney, on payment of £25; 16117 Private A. W. Adams, on payment of £25; 12516 Private A. G. Claxton, on payment of £25; 15891 Private H. Kitcher, termination of engagement, A.O. 106; 9973 Private G. W. Gatesman, termination first period; 19190 Private J. Burke, medically unfit; 17233 Private W. Lovatt, termination of engagement, A.O. 106; 16152 Private J. White, special W.O. authority in Halifax, Nova Scotia; 19772 Private J. E. Wilford, medically unfit.

Departures for Abroad.—To Malta, per s.s. "Dunera," February 10: 10339 Staff-Sergeant F. O. Chappell, 18213 Lance-Corporal W. E. Pacey, 12275 Private R. M. Queere, 18982 Private A. Newman, 19522 Private J. Easton, 18979 Private S. R. Bushnell, 18478 Private A. Burton, 18830 Private F. Bell, 18777 Private W. Aylett, 19366 Private F. Spurrell, 18365 Private R. Thomson.

To Gibraltar, per s.s. "Dunera," February 10: 18403 Lance-Corporal F. Mayell, 19528 Private F. A. Stiff, 19515 Private G. D. Salter, 17870 Private E. Cragg, 19501 Private W. Hahner, 17781 Private A. H. Whyatt, 19566 Private F. G. Dowers, 18093 Private J. Ryan, 18355 Private L. Ogden, 17871 Private H. Falstead, 18269 Private W. Frazer.

To Egypt, per s.s. "Dunera," February 10: 12264 Corporal W. G. Delamere, 19598 Private P. Dawes, 18710 Private A. Tebbut, 10868 Private J. Cornwell, 18868 Private F. Skelly, 19292 Private N. G. Lee, 18886 Private P. Walsh, 19571 Private H. Evans, 19536 Private E. Reece, 19343 Private S. E. Bradley, 18425 Private F. W. Atkinson, 19426 Private E. C. Vidler, 19023 Private A. Tarbet, 18524 Private T. H. Smitherman, 19673 Private F. C. W. Follwell, 18754 Private J. Bostock, 18657 Private N. Tripp, 18329 Private F. G. Davidson, 18737 Private W. T. Stovold, 18686 Private J. Rann, 19099 Private C. G. Drinkwater, 19188 Private E. Smart, 19845 Private A. J. Reynolds, 18859 Private H. C. Day, 11312 Private A. Bateman, 19077 Private J. W. Bennett, 18392 Private H. Y. Berry, 16559 Private W. H. Green, 11763 Private J. T. G. W. Green, 18123 Private J. T. Marr, 18726 Private W. Prosser, 17123 Private W. H. Sawyer, 12411 Private A. A. Sims.

Departure for Abroad.—10086 Staff-Sergeant J. W. Holding to Northern Nigeria.

Change of Station Abroad.—From Barbados to Jamaica on withdrawal of troops from Barbados, February 19: 7385 Sergeant-Major W. E. Hill, 7817 Quartermaster-Sergeant E. Kirk, 6263 Quartermaster Sergeant J. A. Sykes, 8540 Sergeant F. C. E. Godbolt, 17454 Corporal E. C. Allport, 17514 Private R. Laverty, 12187 Private J. A. Brookes, 18005 Private F. R. Churchill, 17616 Private W. Stradling.

Arrivals Home from Abroad.—From Malta, per s.s. "Maine," February 16: 5843 Quartermaster-Sergeant T. A. Crichton, 15753 Private W. Whitmee.

From Barbados, per s.s. "La Plata," March 6: 8894 Sergeant J. W. Parsons, 10445 Sergeant Haynes.

From Barbados, per R.M.S. "Atrato," February 19: 17730 Lance-Corporal P. Wills, 12964 Private H. C. Clark.

From Singapore, per s s. "Palawan," February 28: 9425 Sergeant C. H. Hook, 9083 Sergeant A. G. Bright, 10895 Sergeant W. E. Perritt, 11450 Sergeant A. H. Owens.

Special Extension of Service.—6762 Sergeant-Major B. G. Brook, 7023 Staff-Sergeant J. S. Brown, beyond twenty-one years.

THE FOLLOWING HAVE QUALIFIED IN THE VARIOUS CORPS EXAMINATIONS FOR PROMOTION.

For Sergeant-Major.—Sergeant-Major F. W. Nelson, 6665 Sergeant-Major F. H. Bollen.

For Quartermaster-Sergeant.—7397 Quartermaster-Sergeant H. J. Ford, 7564 Staff-Sergeant W. Ward, 7879 Staff-Sergeant J. D. Simmons, 7818 Staff-Sergeant J. Wilton, 7839 Staff-Sergeant M. Powell, 7734 Staff-Sergeant E. G. Lunney, 8556 Staff-Sergeant H. Barton.

For Staff-Sergeant.—7879 Staff-Sergeant J. D. Simmons, 7564 Staff-Sergeant W. Ward, 12058 Sergeant A. W. Pettley, 11603 Sergeant W. Clegg, 14505 Sergeant H. Jones, 11714 Sergeant E. Kerstein, 9360 Sergeant A. Horn, 12138 Sergeant H. Steele, 9890 Sergeant C. Perry, 12522 Sergeant S. Gallie, 7779 Sergeant H. Porter.

For Sergeant.—9890 Sergeant C. Perry, 10711 Sergeant F. W. Sharpe, 9205 Sergeant F. Judd, 7779 Sergeant H. Porter, 10849 Sergeant C. Richmond, 11554 Sergeant R. Spencer, 9747 Lance-Sergeant C. Williams, 17759 Lance-Sergeant J. Black, 12340 Corporal T. Butler, 11816 Corporal A. Shepherd, 10209 Corporal E. Triggs.

For Corporal.—12583 Lance-Corporal H. Ebbs, 18587 Private C. Leeming, 17794 Private W. A. Beckett, 18019 Private J. G. Julyan, 17735 Private W. Wilson, 11315 Private G. A. Austin, 18199 Private A. H. Staff, 19223 Private J. H. Stafford, 18559 Private G. F. Rodgers, 18530 Private A. Murphy, 9573 Private W. E. Pool, 18763 Private F. J. Smith, 17553 Private J. R. Morfitt, 18295 Private G. Auckland, 19118 Private J. Moore, 14761 Private W. Robertson, 13032 Private T. Kerr, 18230 Private F. Winkley, 18492 Private C. G. Landon, 17513 Private J. Gallivans, 19863 Private W. H. Mattison.

As Compounders.—12582 Corporal J. Whiting, 10880 Corporal L. T. Fitzgerald, 13187 Corporal F. Sparks, 13338 Corporal H. S. Boxshall, 11027 Corporal J. H. Masters, 10421 Corporal T. Giachardi, 16294 Corporal F. E. C. Godwin, 11527 Corporal T. C. Prewett, 11403 Corporal P. E. Wagstaff, 10714 Corporal T. T. Kerns, 17748 Lance-Corporal C. H. Dissent, 13923 Lance-Corporal C. Stewart.

NOTES FROM CHATHAM.—Major T. B. Beach, R.A.M.C., writes (March 1, 1906): "The following remarks are extracts from a letter written by the Coroner for Rochester to the Officer Commanding 10th Company, R.A.M.C., Fort Pitt, Chatham, with reference to the praiseworthy and commendable action taken by a Private of that Company in the case of a civilian who poisoned himself with carbolic acid and on whom an inquest was held: 'I should like to be allowed to bring to your notice the services rendered by No. 19373 Private W. Kitchener, R.A M.C.' The Coroner then fully describes the circumstances under which Private Kitchener rendered first aid to a civilian, whom he found lying unconscious, as a result of carbolic acid poisoning, on the Rochester Recreation Ground, about 8.30 p.m., February 20. Private Kitchener endeavoured to revive the man, and finding his efforts unavailing, fetched a policeman, with whose assistance the man was carried under a lamp, and while the policeman went to fetch an emetic, Private Kitchener performed artificial respiration on the man, whose breathing had stopped altogether. Respiration was re-established and vomiting took place after the emetic was administered. Eventually, the man was removed to the civil hospital in a trap. The Coroner then goes on to say in his letter: 'The foreman of the jury, in returning a verdict . . . . said they thought that Private Kitchener should be commended for his prompt and kindly action towards the deceased. I fully endorse this, and I here remark that Private Kitchener's conduct was in every way worthy of a true man, and reflects great credit on the Corps to which he belongs' . . ."

NOTES FROM THE DEVONPORT DISTRICT.—Major V. Davoren, R.A.M.C., writes (March 8, 1906): "I regret to announce the death at Plymouth, of Deputy-Surgeon-General H. C. Herbert, retired pay, who was buried on Tuesday, March 6, 1906.

"Lieutenant-Colonel Baird having returned to Worcester from leave, Captain A. E. Thorp has been posted to the Military Hospital, Devonport, and has been granted leave to March 22. Lieutenant-Colonel W. B. Day returns from leave to charge of Crown Hill Barracks on March 8. During his absence Civil Medical Practitioner Millar has performed his duties. Lieutenant J. W. S. Seccombe has been placed in command of the detachment at Fort Tregantle. Colonel A. Lang-Brown, R.A.M.C. (R.P.), in medical charge, troops, Taunton, is granted leave of absence from March 9 to March 31, and Lieutenant-Colonel Harris, R.A.M.C. (R.P.), in medical charge, troops, Bodmin, from February 19, 1906, to March 19, 1906. During their absences Civil Medical Practitioners Farrant and Anderson perform their respective duties. Lieutenant-Colonel M. Dundon, R.A.M.C., has assumed medical charge of the Citadel at Plymouth, since February 7, 1906.

"No. 8704 Staff-Sergeant T. J. Tilbrook, R.A.M.C., Sergeant Instructor, Devon Brigade Bearer Company, Royal Army Medical Corps Volunteers, has passed the examination of the Royal Sanitary Institute as an Inspector of Nuisances, at the examination held at Plymouth on January 26 and 27 last. Sergeant-Major P. Crowley is preparing a large class for promotion examinations to be held here early in May next. We wish the candidates every success.

"The Medical Officers' Library here has joined Lewis' Library, London, who supply us monthly with twelve volumes of professional books. Captain F. Carroll, R.A.M.C., has been appointed Honorary Secretary of the book club thus formed."

A very successful Café Chantant was held in Raglan Barracks on February 27, 1906. The following description is from the *Western Daily Mercury*, February 28, 1906:—

"IN AID OF THE MILITARY FAMILIES' HOSPITAL.

"For the purpose of raising funds to provide instruments and appliances for the Military Families' Hospital at Devonport, in excess of those allowed by Government, a very successful Café Chantant was held yesterday at the Garrison Gymnasium. Long before the café opened at 4 p.m. the gymnasium was well filled, and as the time approached carriage after carriage rolled up, and the greatest difficulty was experienced in finding accommodation for the visitors, who comprised the *élite* of the neighbourhood. There were some very dainty toilettes and the room was very tastefully decorated. The tables were arranged in nine groups, each representing a regiment or corps in garrison. As the ladies who gave the tables were attired in the colours of their husbands' corps, the effect was exceedingly pretty and most pleasing. The tables were given by Colonel and Mrs. R. B. Williams, 2nd Somerset L.I.; Colonel and Mrs. G. J. Ellicombe, 2nd Devon Regiment; Colonel and Mrs. L. L. Nicol, 3rd Rifle Brigade; Colonel and Mrs. W. T. Adair, R.M.L.I.; Colonel and Mrs. J. Lewes, R.G.A.; Colonel and Mrs. S. A. E. Hickson, R.E.; Colonel and Mrs. A. J. Erskine, Army Service Corps; Colonel and Mrs. G. D. Bourke, Royal Army Medical Corps; and Colonel and Mrs. O. M. Johnston, Army Pay Department.

"The Committee hoped to realise about £60 from the Café, and, judging by the attendance at the opening, the required amount was easily forthcoming.

"An excellent vocal and instrumental concert was provided, some of the best amateur talent in the garrison contributing. The vocalists included Mesdames Brocklehurst, Watts, and Blackham, Misses Madeleine Morrison and Exham, Major R. Brocklehurst, Somersetshire L.I., and the Rev. M. Longridge, R.N. Mrs. Platt contributed violin solos, Mrs. Longridge pianoforte solos, Major H. H. Bedingfield violin selections, and Colonel Bourke performed on the bones. Miss Williams gave a recitation. The performers were one and all very favourably received. The 2nd Devon Regiment Band, under Mr. J. W. Amers, was exceedingly popular, and at intervals provided a delightful programme of music.

"The arrangements were carried out most efficiently by a Committee, consisting of Colonel Bourke, the Rev. Maurice Jones (who was unfortunately prevented from attending), Colonel and Mrs. Erskine, Major and Mrs. Bedingfield, Major and Mrs. Brocklehurst, and Captain R. J. Blackham, R.A.M.C., who undertook the duties of Secretary."

NOTES FROM THE BARBADOS COMMAND.—Captain A. W. A. Irwin, R.A.M.C., Acting Senior Medical Officer, writes (February 3, 1906): "The contemplated evacuation of Barbados and St. Lucia by the Military has at last commenced in earnest. The 4th Battalion Worcestershire Regiment having left Barbados for Malta in November last were followed by the 67th Company Royal Garrison Artillery, and two Com-

panies, 1st West India Regiment, from St. Lucia in December, the former proceeding home, and the latter to the West Coast of Africa. The remainder of the 1st West India Regiment (two companies) left Barbados for Sierra Leone on January 14, leaving a few details of Staff and Departments to pack up, sell off, and literally erase all remaining signs, with the exception of empty barrack blocks, of what has been at Barbados for over a hundred years, a small but significant military hive. The Military Hospitals at Barbados and St. Lucia were closed on January 31, and the detachment Royal Army Medical Corps at both these islands have dwindled down to a staff of six, some having proceeded home and others to Jamaica to complete a tour of service there.

"A lamentable accident happened during the closing of the Army Medical Store here. Whilst packing the drugs, &c., for home, Sergeant-Major Hill, R.A.M.C., late Regimental Sergeant-Major at the Depôt, Royal Army Medical Corps, received a slight wound of the index finger of the right hand, which rapidly developed gangrene, necessitating almost immediate amputation of the finger and metacarpal bone. He is recovering slowly, and proceeds to Jamaica for duty on the 6th instant.

"Captains Irwin and Adye-Curran embark for home on February 4. The remainder of the N.C.O.'s and men will have left the Command by February 18."

NOTES FROM BLOEMFONTEIN.—Major S. F. Clark, R.A.M.C., writes (February 3, 1906): "The Duke of Connaught finished his inspection of the cantonments by visiting the Military Hospital. He was accompanied by the Duchess and by Princess Patricia, who talked to most of the patients in the wards visited. Generals Maxwell, Hildyard and Jeffreys also went round with the Duke, who noted the interesting cases in the surgical wards, and who made some complimentary remarks to the Senior Medical Officer, Lieutenant-Colonel Risk, on the conclusion of his visit.

"The detachment has played three cricket matches lately, the first of which ended in our 'initial victory.' Our opponents were the 1st Norfolk Regiment, though we do not pretend that it was their very best team. Some good bowling by Major Hinde and Private Rose, aided by the unusual fact that all catches were held, enabled us to get them out for 97. At one time we seemed beaten, as with 8 wickets down we were still 20 runs behind, but the score crept up, and at 90 Private Wilson obliged with 4 boundaries in one over, and in the end we got to 119. The chief contributors to this total were Major Clark (49 not out), Private Wilson (19), and Lieutenant Le Bas (16). In the return we fared badly. At the last moment Major Hinde and Private Wilson were unable to come, so our scorer and his assistant, neither of whom pretend to be players, were pressed into the team. Our last four wickets fell at the same total, and 70 was all we could put together. Major Clark (30) and Private Walton (15) were the only contributors of double figures. When the Norfolks batted, the dropped catches were so numerous that it seemed impossible to get a man out, and 60 was notified when Private Rose, who bowled well all through, upset the sticks of the first batsman. With Major Hinde (our bowler) absent, and catches being dropped, it looked as if we were in for a long leather hunt, but Private Rose pegged away at one end, and Major Clark and Private Walton bowled above themselves at the other, so that in the end we rattled them out for 132—all but two clean bowled. In between these two we had an exciting match with the Royal Engineers; Major Hinde and Private Rose got them out very cheaply for 89, and as Lieutenant Le Bas (20) and Private Pollard (18) put up 38 for our first wicket we seemed safe, but from this point we went to pieces and were beaten by 2 runs. Private Walton (23 not out) nearly got us home, but the fact of having two men run out ruined our chance of victory. Our ground fielding has improved considerably, but we still require to hold catches, while the art of running between the wickets is at a low ebb. With good fielding our attack would be by no means contemptible, but we could do well with some batsmen.

"Of the countless tents that once covered the ground all round Bloemfontein only those of the Royal Army Medical Corps remain. All other units are housed, and we hope that the Duke of Connaught's visit will give a fillip to the completion of the new Military Hospital."

NOTES FROM CALCUTTA, INDIA.—Captain E. Blake Knox, R.A.M.C., Secretary to the Principal Medical Officer, His Majesty's Forces in India, writes (February, 14, 1906):—

"*Appointments.*—Colonel W. E. Trevor, to be Honorary Surgeon to his Excellency the Viceroy, *vice* Surgeon-General W. S. Pratt, transferred to the Home Establishment. Lieutenant-Colonel A. E. Morris to the command of the Station Hospital, Saugor. Lieutenant-Colonel T. B. Winter to Station Hospital, Meerut, for duty. Major H. A.

Hinge to command Station Hospital, Indore. Major W. J. Taylor to Station Hospital, Kamptee, for duty. Major L. A. Mitchell to command Station Hospital, Jubbulpore, during absence of Lieutenant-Colonel C. E. Nichol, on leave. Captain M. M. Rattray to Station Hospital, Colaba, for duty. Lieutenant J. G. Bell to Station Hospital, Jhansi, for duty. Lieutenant T. S. Coates to Station Hospital, Mhow, for duty. Lieutenant L. V. Thurston to Station Hospital, Mhow, for duty. Captain A. H. Waring is appointed a specialist in skiagraphy and posted to Mian Mir. Major J. C. Morgan to be Sanitary Officer, Eastern Command, *vice* Major A. R. Aldridge, proceeding home, tour expired. Captain A. McMunn to command Station Hospital, Jutogh. Captain O. G. Thomson to Station Hospital, Mian Mir, for duty. Lieutenant M. Sinclair to Station Hospital, Rawal Pindi, for duty. Lieutenant C. W. O'Brien to Station Hospital, Peshawar, for duty.

"*Transfers.*—Colonel A. W. P. Inman from Lucknow to Hong Kong, as Principal Medical Officer. Lieutenant H. G. S. Webb from 1st (Peshawar) Division to 3rd (Lahore) Division, which he will join on return from leave in England.

"*Leave.*—Lieutenant-Colonel C. E. Nichol for two and a half months in India, from December 1, 1905. Lieutenant-Colonel J. J. C. Donnett, for eight months out of India, from March 30, 1906. Lieutenant-Colonel J. R. Forrest for eight months out of India, from April 1, 1906. Lieutenant-Colonel C. C. Reilly, for seven months out of India, from April 2, 1906. Major C. W. Allport, for five months, from March 1, 1906, pending retirement. Major F. A. Symens, for eight months out of India, from April 30, 1906. Captain G. Carter, to Ceylon, from January 28 to February 11, 1906. Captain T. J. Potter, for six months (on medical certificate) out of India, from January 26, 1906.

"*Retirements.*—Major S. J. W. Hayman, with effect from January 30, 1906.

"*Embarkations.*—The following officers sailed for England, tour expired, on February 14, 1906: Lieutenant-Colonel S. Townsend, Captains F. P. Lauder and A. C. Adderley.

"*Departures.*—Colonel A. W. P. Inman for England, on recommendation of Medical Board.

"*Examinations.*—Lieutenant A. H. Hayes passed in h (i.) at Ambala, on January 10, 1906."

NOTES FROM MAURITIUS.—Lieutenant-Colonel N. Manders, R.A.M.C., writes (February 10, 1906): "The following Officers, Non-commissioned Officers and men arrived for duty in this command on January 31, per hired transport "Soudan," viz.:—

"*Officers.*—Lieutenant-Colonel A. Peterkin, R.A.M.C., Captain C. S. Smith, R.A.M.C., Lieutenant G. S. Wallace, R.A.M.C.

"*Non-commissioned Officers and Men.*—11761 Sergeant F. S. Walls, 11146 Sergeant E. Wing, 8657 Lance-Sergeant H. Skeets, 11211 Corporal L. F. Marsden, 11665 Corporal H. W. Miller, 11649 Corporal T. H. Mustill, 18438 Private L. Boyes, 19165 Private H. E. Faith, 18658 Private E. R. Gardiner, 15714 Private J. Harwarden, 18906 Private F. Heedy, 17400 Private P. Sarsfield, 18582 Private J. T. Vince, 18865 Private J. Ward, 17275 Private G. H. Wheeler, 18734 Private S. Wilson, 18014 Private B. J. Yate.

"Captains H. E. Staddon and C. S. Smith, R.A.M.C., proceeded in temporary medical charge of the H.T. "Soudan," to and from Bombay, which left here on January 31 and is expected to return on or about February 25. These officers will then be relieved by those under orders for England, viz., Colonel E. North, Senior Medical Officer, and Captains G. E. F. Stammers and J. G. Foster, R.A.M.C. The departure of these officers is much regretted, and especially in the case of Colonel E. North, R.A.M.C., the Senior Medical Officer, who during his tenure of office has done much, both to improve the sanitary condition of the camps and promote the general welfare of the troops. He instituted the Mauritius Military Football League, which has done a great deal to relieve the monotony of this quiet and non-sporting island, and the shieid which was presented by him some two seasons ago is keenly contested for. We wish him success in his new sphere of life at home. In Captain Stammers we lose the champion lawn tennis player in the island; let us hope his mantle will fall on the shoulders of one of our new arrivals. Tennis in Mauritius is not, it must be confessed, quite up to Wimbledon form, but at the same time it is distinctly above the average, and to carry off the championship needs a player quite at the top of the second class. We shall greatly miss the weekly meetings on his tennis court, where many a keen contest has been held."

NOTES FROM PRETORIA.—Major H. J. M. Buist, D.S.O., R.A.M.C., writes (February 5, 1906): "The following changes of station, &c., have taken place in this Command during the month of January, 1906:—

"*Arrivals.*—The following officers arrived from England and were posted to Pretoria for duty: Major W. E. Hardy, Lieutenant E. G. R. Lithgow, Lieutenant and Quartermaster V. Ferguson.

"*Departures.*—The following officers proceeded to England: Captain J. W. West (on expiration of tour), Lieutenant and Quartermaster A. Morrison (in exchange with Lieutenant and Quartermaster H. Spackman)."

NOTES FROM MIAN MIR.—Lieutenant-Colonel H. D. Rowan, R.A.M.C., writes (February 28, 1906): "At a meeting of the officers of the Royal Army Medical Corps and Indian Medical Service, held at the Station Hospital, Mian Mir, on January 25 (Colonel Barrow, R.A.M.C., presiding), it was decided to form a Medical Society and a Medical Library, to consist of medical officers in the Lahore District. Captain Rogers, R.A.M.C., was elected Honorary Secretary. The first meeting of the Society was held on February 2, when Colonel Barrow read a paper on the 'Treatment of Varicose Veins by Injection of Carbolic Acid.' Excellent results appear to have been obtained by this method of treatment, and as it was novel to most of those present at the meeting, the paper excited considerable discussion. Several microscopic slides and a case of leprosy were also exhibited by Messrs. Crawford, Soltau, and O'Neill. At the second meeting, held on February 16, Lieutenant-Colonel Rowan, R.A.M.C., read a paper on 'The Health of Mian Mir, Past and Present.' The health, or rather the unhealthiness, of Mian Mir was reviewed for the past fifty years, and it was demonstrated that of late there had been a marked improvement, most probably the outcome of improved sanitation and a more accurate knowledge of malaria, and the opinion was expressed that, given a good water supply, Mian Mir might yet live down its evil reputation. Both meetings were very well attended. The Medical Library has made a good start: we have got a considerable number of subscribers, and as we were able to make a donation from our dairy and soda water funds, we start with nearly 200 rupees worth of new books. An important feature of the Library will be that officers at out stations will get their books exchanged post free."

NOTES FROM SIERRA LEONE.—Captain A. H. Morris, R.A.M.C., writes (February, 1906): "Major G. T. Rawnsley and Captain J. McCarthy arrived for duty in December and have both been posted to Mount Aureol. Major G. S. McLoughlin and Captain H. W. Grattan embarked for England, tour expired, on December 23. Captain A. H. Morris has taken over the duties of Sanitary Officer from Captain H. W. Grattan.

"The 2nd Battalion West Indian Regiment has left Sierra Leone to proceed to Jamaica and has been relieved by the 1st Battalion West Indian Regiment. This Battalion has gone into the barracks at Mount Aureol, and No. 50 Company Royal Garrison Artillery has come down to occupy the barracks at Tower Hill."

QUEEN ALEXANDRA'S IMPERIAL MILITARY NURSING SERVICE.

The following ladies have received appointments as Staff Nurses: Miss A. J. St. Clair, Miss C. A. Coats, Miss D. M. Smith.

Postings and Transfers.—Sisters: Miss M. E. Harding, to Military Hospital, Curragh, on return from South Africa; Miss E. J. Martin to Military Hospital, Hounslow, on return from South Africa; Miss A. Nixon, to the Charing Cross Hospital, for a course of two months post-graduate study, on return from South Africa; Miss E. M. E. Todd, to the London Hospital, for a course of two months post-graduate study, from Connaught Hospital, Aldershot; Miss A. A. Murphy, to Royal Victoria Hospital, Netley, from Military Hospital, Hounslow. Staff Nurses: Miss M. Antrobus, to Royal Victoria Hospital, Netley, from the Queen Alexandra Military Hospital, Millbank; Miss M. E. Brewer, to Cambridge Hospital, Aldershot, on appointment; Miss M. Darvill and Miss E. A. Harvey, to the Queen Alexandra Military Hospital, Millbank, on appointment; Miss E. G. Barrett, to Royal Infirmary, Dublin; Miss A. S. Siddons, to Military Hospital, Gibraltar, on appointment.

Appointments Confirmed.—Staff Nurses: Miss M. Antrobus, Miss M. C. E. Newman, Miss M. Barton, Miss E. C. Ellis, Miss F. M. Tosh.

ARMY MEDICAL RESERVE OF OFFICERS.

Surgeon-Lieutenant-Colonel George Middlemiss, M.D., having resigned his Commission in the Volunteers, ceases to belong to the Army Medical Reserve of Officers, dated March 3, 1906.

Surgeon-Major Charles N. Lee, M.B., to be Surgeon-Lieutenant-Colonel, dated February 14, 1906.

Surgeon-Major Francis J. L. Warwick, M.B., having resigned his Commission in the Volunteers, ceases to belong to the Army Medical Reserve of Officers, dated March 3, 1906.

Surgeon-Captain Campbell Boyd to be Surgeon-Major, dated February 24, 1906.

VACANT RETIRED PAY APPOINTMENTS.

Halifax, Beverley, Brecon, Fleetwood, Pontefract, Berwick, Armagh, Longford, Warrington, Strensall, Trowbridge, Richmond (Yorks), Horfield, Scarborough, Bradford, Military Prison (Dover), Alderney, Burnley (Rectg.), Enniskillen, Birr.

ROYAL ARMY MEDICAL CORPS (MILITIA).

Captain and Honorary Major (Honorary Captain in the Army) J. T. Simpson to be Major, dated January 13, 1906.

Captain (Honorary Captain in the Army) A. H. Benson is granted the honorary rank of Major, dated February 2, 1906.

IMPERIAL YEOMANRY.

West Somerset.—Surgeon-Lieutenant C. Farrant to be Surgeon-Captain, dated March 3, 1906.

HONOURABLE ARTILLERY COMPANY OF LONDON.

Surgeon-Major and Honorary Surgeon-Lieutenant-Colonel W. C. James, M.D., to be Surgeon-Lieutenant-Colonel, dated February 5, 1906.

ROYAL ARMY MEDICAL CORPS (VOLUNTEERS).

Scottish Command: Glasgow Companies.—Lieutenant G. Gordon, M.B., to be Captain, dated March 3, 1906.

Scottish Command: Aberdeen Companies.—Peter Howie, M.B., to be Lieutenant, dated March 14, 1906.

Scottish Command: Edinburgh Company.—John May Darling, M.B., to be Lieutenant, dated March 3, 1906.

Scottish Command: Glasgow Companies.—Captain (Surgeon-Captain, Army Medical Reserve of Officers) S. M. Sloan, M.B., resigns his Commission, dated March 14, 1906.

OTHER VOLUNTEER CORPS.

1st Volunteer Battalion, the Royal Scots Fusiliers.—Surgeon-Lieutenant (Honorary Lieutenant in the Army) J. C. Taylor, M.B., to be Surgeon-Captain, dated February 17, 1906.

2nd Volunteer Battalion, the Cameronians (Scottish Rifles).—Surgeon-Lieutenant-Colonel R. T. C. Robertson, M.B., is granted the honorary rank of Surgeon-Colonel, dated February 16, 1906.

Surgeon-Lieutenant-Colonel and Honorary Surgeon-Colonel R. T. C. Robertson, M.B., resigns his Commission, with permission to retain his rank and to wear the prescribed uniform, dated February 17, 1906.

1st Cinque Ports Volunteer Rifle Corps. — Surgeon-Lieutenant H. G. L. Allford resigns his Commission, dated February 17, 1906.

2nd Volunteer Battalion, the Durham Light Infantry.—Alexander Charles Farquharson, M.D. (formerly Lieutenant), to be Surgeon-Lieutenant, dated February 17, 1906.

1st Warwickshire Royal Garrison Artillery (Volunteers).—Surgeon-Lieutenant G. Haddow, M.B., to be Surgeon-Captain, dated February 24, 1906.

1st Worcestershire Royal Garrison Artillery (Volunteers).—George Mackie, Gent., to be Surgeon-Lieutenant, dated February 24, 1906.

1st Gloucestershire Royal Engineers (Volunteers).—Surgeon-Captain W. Cox to be Surgeon-Major, dated February 24, 1906.

The Forth Division (Submarine Miners) Royal Engineers (Volunteers).—Surgeon-Major H. Hay, M.B., resigns his Commission, with permission to retain his rank and to wear the prescribed uniform, dated February 24, 1906.

4th Volunteer Battalion, The Cameronians (Scottish Rifles).—Surgeon-Captain A. F. Wilson-Gunn, M.B., resigns his Commission, dated February 24, 1906.

2nd Volunteer Battalion, the Duke of Cornwall's Light Infantry.—Surgeon-Captain J. C. Mackay, M.D., resigns his Commission, dated February 24, 1906.

2nd (Angus) Volunteer Battalion, the Black Watch (Royal Highlanders).—Robert Hugh Gilbert Bruce, Gent., to be Surgeon-Lieutenant, dated February 24, 1906.

1st Volunteer Battalion, the Duke of Cambridge's Own (Middlesex Regiment).—Henry Lonsdale Gregory, M.B., to be Surgeon-Lieutenant, dated February 24, 1906.

1st Forfarshire Royal Garrison Artillery (Volunteers).—Surgeon-Lieutenant-Colonel W. Chalmers-Cowan is granted the honorary rank of Surgeon-Colonel, dated March 3, 1906.

The Tyne Division (Submarine Miners) Royal Engineers (Volunteers).—Surgeon-Major F. W. Gibbon is granted the honorary rank of Surgeon-Lieutenant-Colonel, dated March 3, 1906.

The Queen's Rifle Volunteer Brigade, the Royal Scots (Lothian Regiment).—Lawrence William Pole, M.B., to be Surgeon-Lieutenant, dated March 3, 1906.

8th Volunteer Battalion, the Royal Scots (Lothian Regiment).—Surgeon-Lieutenant W. P. Simpson resigns his Commission, dated March 3, 1906.

2nd (Earl of Chester's) Volunteer Battalion, the Cheshire Regiment.—Surgeon-Lieutenant A. MacLennan, M.B., to be Surgeon-Captain, dated March 3, 1906.

1st Volunteer Battalion, the Duke of Cambridge's Own (Middlesex Regiment).—Henry William Spaight, Gent., to be Surgeon-Lieutenant, dated March 3, 1906.

2nd London Volunteer Rifle Corps.—Surgeon-Captain S. A. M. Copeman, M.D., F.R.S., to be Surgeon-Major, dated February 12, 1906.

1st Gloucestershire Royal Garrison Artillery (Volunteers).—Surgeon-Lieutenant-Colonel J. S. Carleton is granted the honorary rank of Surgeon-Colonel, dated March 14, 1906.

2nd Middlesex Royal Garrison Artillery (Volunteers).—Surgeon-Major (Honorary Captain in the Army) A. Thorne, M.B., to be Surgeon-Lieutenant-Colonel, dated February 19, 1906.

2nd Lancashire (The St. Helens) Royal Engineers (Volunteers).—Surgeon-Captain R. Jackson, M.B., to be Surgeon-Major, dated March 14, 1906.

EXAMINATIONS.

The following results of examinations are notified for general information:—

Passed in Military Law for the rank of Lieutenant-Colonel. *Majors*—J. C. Connor, M.B., T. H. Corkery, J. Girvin, H. A. Hinge, C. J. Macdonald, M.D., H. J. Parry, D.S.O., M.B., E. McK. Williams, R. J. Windle, M.B., E. G. Browne, C. W. R. Healey, A. W. Bewley, R. N. Buist, M.B., A. L. F. Bate, A. J. Luther, J. D. Alexander, M.B., G. S. Crawford, R. J. Copeland, M.B. (·8), D. M. O'Callaghan, Brevet Lieutenant-Colonel W. B. Leishman, M.B., J. C. Weir (·8), F. W. Begbie, A. Hosie, M.B., D. D. Shanahan, J. W. Bullen, M.D. (·8), J. H. E. Austin, A. B. Hinde (·8), W. J. Trotter, G. St. C. Thom, M.B. *Captains*—L. F. Smith, M.B., R. W. Clements, M.B., H. P. W. Barrow.

Passed in Military Law for rank of Captain. *Lieutenants*—C. W. Holden, R. L. V. Foster, M.B., M. G. Winder, F. C. Lambert, T. S. Dudding, O. Ievers, M.B., H. H. J. Fawcett (·8), S. E. Lewis, M.B., J. T. McEntire, M.B., N. E. Dunkerton, E. M. Glanvill, M.B. (·8), G. S. Mackay, M.B., G. F. Rugg, D. S. B. Thomson, M.B., A. B. Smallman, M.B., W. F. Tyndale, C.M.G., M.B., J. McKenzie, M.B., N. D. Walker, M.B., A. H. Hayes, H. J. Crossley, R. B. Ainsworth, R. Storrs, J. M. H. Conway, H. V. Bagshawe, W. W. Browne, R. Rutherford, M.B., N. E. J. Harding, M.B., R. J. Franklin, J. G. Bell, F. W. W. Dawson, M.B., R. M. Ranking, M.B., T. S. Coates, M.B., A. E. B. Wood, M.B., R. H. Bridges, J. A. W. Webster, H. B. Kelly, E. M. Pennefather, B. H. V. Dunbar, J. M. M. Crawford, J. H. Duguid, M.B., G. W. G. Hughes, R. H. McNicol, M.B., S. L. Pallant, J. D. Richmond, R. T. Collins, J. Fairbairn, M.B., A. L. Otway, M.B., M. D. Ahern, N. de E. Harvey, M.B., F. A. H. Clarke, G. A. K. H. Read, W. C. Rivers, G. H. G. Brown, M.B., C. Bramhall, H. T. Stack, M.B.

Passed in Technical Subjects for the rank of Lieutenant-Colonel. *Majors*—T. H. Corkery (now Lieutenant-Colonel), R. H. Penton, D.S.O., R. W. Wright, G. T. Rawnsley, R. Holyoake, O. R. A. Julian, C.M.G., H. T. Knaggs, M.B., R. J. Windle, W. H. Horrocks, M.B., C. W. R. Healey, H. I. Pocock, D. M. O'Callaghan, J. J. Gerrard, M.B., Brevet Lieutenant-Colonel W. B. Leishman, M.B. (·9 in selected subject), A. Hosie, M.B., T. McCulloch, M.B. (·9 in selected subject), A. E. Smithson, M.B., J. W. Bullen, M.D., J. H. E. Austin, C. Garner, M.B., G. Scott, G. F. H. Marks, W. S. Dowman, F. J. Morgan, C. H. Hale, D.S.O., B. H. Scott, B. J. Inniss, R. C. Thacker, A. L. F. Bate, A. J. Luther, W. Hallaran, M.B.

Passed in (h. ii. and iii.) for the rank of Captain. *Lieutenants*—R. L. V. Foster, §

Note.—§ after a name indicates that this officer obtained a "special certificate."

M.B., M. G. Winder,§ T. S. Dudding, O. Ievers, H. H. J. Fawcett, S. E. Lewis, N. E. Dunkerton, E. M. Glanvill, M.B., G. S. Mackay, M.B., G. F. Rugg,§ D. S. B. Thomson, C. W. Holden, G. W. G. Hughes, A. B. Smallman, M.B., W. F. Tyndale, C.M.G., M.B., J. McKenzie, M.B., A. H. Hayes, R. B. Ainsworth, R. Storrs, F. A. H. Clarke, G. A. K. H. Reed, W. C. Rivers, J. M. H. Conway, H. V. Bagshawe, R. Rutherford, M.B., N. E. J. Harding, M.B., R. J. Franklin, J. G. Bell, T. S. Coates, A. E. B. Wood, M.B., R. H. Bridges, J. A. W. Webster, H. B. Kelly, E. M. Pennefather, G. H. J. Brown, M.B., C. Bramhall, N. L. E. Harvey, M.B., H. T. Stock, J. D. Richmond, M.B., R. T. Collins, J. Fairbairn, M.B., A. L. Otway, M.B., M. D. Ahern.

The following Lieutenants have been notified as having passed in (h.) i.: A. B. Smallman, M.B., W. F. Tyndale, C.M.G., M.B., P. Davidson, D.S.O., M.B., W. F. Ellis, J. McKenzie, M.B., N. D. Walker, M.B., A. H. Hayes, H. J. Crossley, R. B. Ainsworth, C. J. A. Balck, M.B., R. Storrs, R. L. V. Foster, M.B., F. A. H. Clarke, G. A. K. H. Reed, J. W. S. Seccombe, J. M. H. Conway, N. E. J. Harding, M.B., S. M. W. Meadows, H. V. Bagshawe, H. G. S. Webb, W. W. Browne, R. Rutherford, M.B., W. D. C. Kelly, M.B., W. C. Rivers, J. G. Bell, M.B., M. G. Winder, F. W. W. Dawson, M.B., R. M. Ranking, M.B., A. E. B. Wood, M.B., F. C. Lambert, J. B. Meldon, R. C. Wilmot, D. G. Carmichael, M.B., J. M. M. Crawford, C. Bramhall, J. H. Duguid, G. W. G. Hughes, T. S. Dudding, S. E. Lewis, M.B., J. T. McEntire, M.B., N. E. Dunkerton, P. J. Hanafin, E. M. Glanvill, M.B., G. S. Mackay, M.B., T. J. Wright, D. S. B. Thomson, M.B., J. Fairbairn, M.B.

List of Captains who passed 2nd Senior Course, 1905.

Names	Class of certificate awarded	Acceleration in promotion	Special subject	Qualified as a specialist
Gill, J. G.	*Nil*	*Nil*	Ophthalmology	No
Lelean, P. S.	2nd	6 months	Operative surgery	Yes
Argles, R. L.	*Nil*	*Nil*	Bacteriology	No
Powell, E. W.	2nd	6 months	,, ...	Yes
Fitzgerald, F. G.	3rd	3 ,,	,, ...	No
Hardy, F. H.	2nd	6 ,,	Midwifery and gynæcology	Yes
Ormsby, G. J. A.	*Nil*	*Nil*	,, ,, ,,	No
Mackenzie, T. C.	,,	,,	Dermatology, &c.	,,
Butler, S. G.	3rd	3 months	Operative surgery	Yes
Matthews, J.	,,	3 ,,	Ophthalmology	,,
Watts, B.	,,	3 ,,	Midwifery and gynæcology	,,
Gwynn, W. P.	,,	3 ,,	State medicine	No
Sloan, J. M...	,,	3 ,,	,, ,, ...	Yes
Packer, H. D.	,,	3 ,,	Bacteriology	,,
Cowan, J.	,,	3 ,,	,, ...	,,
McGrigor, H. J.	2nd	6 ,,	Dermatology, &c.	,,
Wingate, B. F.	*Nil*	*Nil*	State medicine	No
Selby, R.	3rd	3 months	Dermatology, &c.	Yes
Lloyd, R. H.	,,	3 ,,	Ophthalmology	No
Chopping, A. C.	,,	3 ,,	State medicine	,,
Leake, J. W.	,,	3 ,,	,, ,, ...	Yes
Palmer, H. K.	*Nil*	*Nil*	,, ,, ...	No
Inkson, E. T.	,,	,,	Bacteriology	,,

MILITARY FAMILIES' HOSPITAL, CHATHAM BARRACKS.

In Charge: Major E. Keble, R.A.M.C. *Head Nurse:* Miss B. M. E. Bygott, L.O.S., Army Nursing Service (Reserve). *Nurses:* Miss Schliemann, L.O.S., A.N.S.(R.); Miss Cairney, L.O.S.

A Committee of officers appointed by the General Officer Commanding has charge of a Charitable Fund connected with the Institution, and all unofficial financial matters are to be referred to them.

Note.—§ after a name indicates that this officer obtained a "special certificate."

President and Hon. Treasurer: Major A. E. C. Keble, R.A.M.C.

All women and children on the strength of their Corps, including Royal Marines, are treated free of expense.

Copies of the Rules can be obtained on application to the Officer in Charge, or to the Head Nurse.

The wives of soldiers married without leave are admitted to the Hospital on payment of 6d. per diem. In very special cases the whole or part of this payment may be remitted on the special written recommendation of the Officer Commanding the Corps to which the husband belongs.

ANNUAL REPORT FOR 1905.

(1) Owing to the reconstructing and rebuilding, the Hospital was closed to general cases for the first six months of the year; nevertheless its popularity has been more than maintained, for in spite of the closure the total number of admissions—233—fell only 17 behind the total admitted in 1904, and 84 more than were admitted in 1903. This was chiefly due to the large increase in the number of maternity cases, the total of such cases for the year being 123, against 77 in 1904, and 65 in 1903.

(2) During the year the Hospital has been partly rebuilt and reconstructed. The heating is by means of hot-water radiators. Electric light has been installed throughout the entire building. The hospital is now a model of its kind, and is vastly superior to many, if not all, similar civil institutions. The equipment—hospital, surgical and medical—leaves very little, if anything, to be desired.

(3) The Out-Patient Department continues to be a great success; 2,003 patients attended 4,786 times. In order to facilitate the work in this department, a block containing a consulting room, patients' waiting-room, and dispensary, has been specially built. Every convenience for the rapid and efficient treatment of disease has been provided.

(4) During the half-year the general site of the Hospital was open, 60 women and 50 children were admitted; 45 operations were performed.

The operations were as follows:—

		Result.
Removal of uterus and appendages	1	Recovered.
Removal of uterine polypi	1	,,
Removal of osseous tumours	5	,,
Curettement	19	,,
Removal of nasal polypi	1	,,
Removal of adenoids	16	,,
Operation for talipes	1	,,
Appendectomy	1	,,

(5) Admissions by Corps:—

Corps	Women		Children	Total
	Parturition	Other diseases		
Royal Engineers	31	9	23	63
Royal Marine Light Infantry	29	12	10	51
Rifle Brigade	17	4	6	27
Oxfordshire Light Infantry	18	1	3	22
Army Service Corps	8	9	3	20
Welsh Regiment	6	8	2	16
Royal Artillery	6	6	1	13
Argyll and Sutherland Highlanders	1	2	2	5
Army Ordnance Corps	2	2	..	4
Army Pay Corps	2	2	..	4
Garrison Staff	..	4	..	4
Royal Army Medical Corps	2	..	..	2
Royal Garrison Regiment	1	1	..	2
Totals	123	60	50	233

BALANCE SHEET, 1905.

RECEIPTS.

	£	s.	d.
Balance in hand	11	1	11
Cash in hand	1	5	5½
Institute R.E.	25	0	0
,, R.M.L.I.	21	0	0
,, R.A.	7	2	0
,, 4th Batt. Rifle Brigade	5	0	0
,, Oxford Light Infantry	5	0	0
,, The Welsh Regiment	5	0	0
,, Army Service Corps..	4	0	0
,, Garrison, Gravesend	5	0	0
Subscribed by Army Ordnance Corps	1	15	0
Collection Garrison Church ..	3	16	0
Christmas Grants from Institutes	6	2	6
Cash	0	10	0
Special Grant R.M.L.I. ..	10	0	0
	£111	12	10½

EXPENDITURE.

	£	s.	d.
Matron's Expenses	22	16	11
Messrs. Bailey and Sons ..	51	12	9
Messrs. Down Bros.	9	6	2
Messrs. Whitehead	6	2	6
George Church	2	7	6
Cheque Book	0	2	1
Balance in Bank	17	19	6
Cash in hand	1	5	5½
	£111	12	10½

Audited and found correct,
COLIN L. MACNAB, Major,
D.A.A. & Q.M.G., T. & M. Defences,
March 10, 1906.

E. KEBLE, Major R.A.M.C.,
President and Treasurer,
March 10, 1906.

A further sum of £100 has since been subscribed to further improve this excellent Hospital.

ROYAL MASONIC INSTITUTION FOR BOYS.

ELECTION, APRIL, 1906.

THE votes and interest of the Patrons, Presidents, Governors, Subscribers, &c., of the Institution are earnestly solicited on behalf of Henry Percy Mackinnon, aged 9, son of the late Brother Lieutenant-Colonel H. W. A. Mackinnon, D.S.O., R.A.M.C., who died March 24, 1905, leaving his widow and two children (a girl, aged 10, in addition to the above-named) almost totally unprovided for.

The widow's sole means of support is the interest on £250 invested at 4 per cent.

The widow and children are ineligible for pension or compassionate allowance from Army funds, owing to disparity of age between Mrs. Mackinnon and her late husband, although they had been married twelve years.

Brother Mackinnon was initiated in St. John the Evangelist Lodge, No. 1483, Punjab, in March, 1874; was a member of St. John and St. Paul Lodge, No. 349, Malta, from 1877 to 1880 (served as J.W.); was a member of Pentangle Lodge, Chatham, from 1881 to 1883; was latterly for some years a member of Army and Navy Lodge, Aldershot, No. 1971.

In the Royal Artillery he belonged to Chapters 349, 407 and 782.

In the Mark, he had been a member of Lodges Nos. 107, 248 (W.M. and Founder), 311 (Founder).

In K.T. was a member of St. George's (P.P.), and St. Michael's Preceptories (Founder).

In A. and A. Rite had taken 18°, and had been a member of Rose of Sharon and Rose and Lily Chapters.

The case is strongly recommended by the Provincial Grand Lodge of Hampshire and the Isle of Wight; the Deputy Master and Brethren Aldershot Army and Navy Lodge, No. 1971; the Worshipful Master and Brethren Household Brigade Lodge,

No. 2614 ; the Deputy Master and Brethren Nil Sine Labore Lodge, No. 2736; Right Worshipful Brethren Right Hon. the Earl of Euston, Prov. G.M. North. and Hunt. ; Brigade-Surgeon J. Balfour Cockburn, M.D., Prov. G.M. Guernsey and Alderney; Sir Augustus F. W. E. Webster, Bart., Prov. G.M. Hants and Isle of Wight; Right Hon. the Earl of Onslow, G.C.M.G., P. Prov. G.M. Surrey; Field-Marshal the Right Hon. Earl Roberts, V.C., K.P., G.C.B., &c., &c., Past Grand Warden ; Very Worshipful Brother Sir Edward Letchworth, Grand Secretary, Vice-Patron and Past Treasurer; Worthy Brethren Major J. E. Le Feuvre, V.D., P.G.D., P. Dep. Prov. G.M. Hants and Isle of Wight; Arthur H. Bowles, P.G.D., W.M. Astolat Lodge, No. 2858; P.M. Wey Side Lodge, No. 1395; Dr. John H. Salter, P.G.D., Dep. Prov. G.M. Essex ; Lieutenant-Colonel H. Grier, R.A.M.C., P.G.D. ; Colonel Sir James Clark, Bart., C.B. ; Edgar Figgess, P.G. Std. B., P.M. Tuscan Lodge, No. 14 ; George J. Fowler, P.M. Iris Lodge, No. 2545 ; Brigadier-General Francis Lloyd, C.B., D.S.O., Dep. Master Lodge No. 1971; Colonel Charles J. Blake, R.A., P.M. St. John and St. Paul Lodge, No. 349; Colonel Robert G. Gordon-Gilmour, C.B., M.V.O., D.S.O., P.M. Household Brigade Lodge, No. 2614; Colonel H. E. R. James, Com. R.A.M. Coll. ; J. G. Pilcher, J.P., D.L. ; G. Crawford Thomson, M.D., W.M. Cheselden Lodge, No. 2870; Captain W. Lyons, P. Prov. G.D., P.M. Aldershot Camp Lodge, No. 1331; the Rev. Bernard Harvey, W.M. Hertford Lodge, No. 403; Lieutenant-Colonel H. W. Morrieson, R.A., P.M. Centurion Lodge, No. 1718; Colonel F. W. B. Landon, C.B., P.D.M. Nil Sine Labore Lodge, No. 2736; Lieutenant-Colonel J. G. Harwood, P.M., P.D.G.M. Bengal; the Rev. C. Rushbrook Nunn, P.P.G.C. Cheshire, and by Worthy Brother Major H. Pidcock-Henzell, P.M., P. Prov. G.W., J.P., Pinehurst, Farnboro', Hants, by whom proxies will be thankfully received.

Officers may, perhaps, be able to render assistance in this case by giving votes, or by securing the support of friends who may have votes for the Royal Masonic Institution. The case is strongly recommended, and is one of special urgency.

ROYAL SCHOOL FOR THE DAUGHTERS OF OFFICERS OF THE ARMY.

ELECTION, JUNE, 1906.

THE Director-General would be glad if officers, who may have a vote or votes at their disposal, in connection with the Royal School for the Daughters of Officers of the Army, would support the claims of GERALDINE EVA PEARD (nine years of age), daughter of the late Lieutenant-Colonel H. J. Peard, C.M.G., R.A.M.C.

Lieutenant-Colonel Peard was a distinguished officer of our Corps, and after serving throughout the South African War he died at Middelburg, Cape Colony (after only three days' illness), from malignant scarlet fever, contracted in his attendance on cases of the disease.

Officers may perhaps be able to render assistance in this case by securing the support of any friends they may have among subscribers.

Communications in this matter should be addressed to The Manager, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, 68, Victoria Street, London, S.W.

SCHOLASTIC.

MRS. PEARD (widow of Lieutenant-Colonel H. J. Peard, C.M.G., R.A.M.C.) is opening a boarding house, in connection with a high-class school, at Surbiton (head mistress, Miss Procter, daughter of the late Major-General Montagu Procter, B.S.C.). Daughters of gentlemen only received. Home life and care combined with highest education. Apply to Head Mistress, 2, Surbiton Park Crescent, Kingston-on-Thames.

References kindly permitted to: Surgeon-General A. Keogh, C.B., Director-General, A.M.S.; Surgeon-General W. J. Fawcett, C.B., A.M.S. ; Colonel D. Bruce, C.B., F.R.S., R.A.M.C. ; Lieutenant-Colonel W. Babtie, V.C., C.M.G., R.A.M.C. ; Lieutenant-Colonel B. Skinner, R.A.M.C.; Lieutenant-Colonel W. G. Macpherson, C.M.G., R.A.M.C.; Major T. McCulloch, R.A.M.C.

THE ROYAL ARMY MEDICAL CORPS FUND.

NOTICE OF FOURTH GENERAL MEETING.

THE Fourth General Meeting of Subscribers to this Fund will be held in the Theatre of the Royal United Service Institution on Monday, June 18, 1906, at 3 p.m. The Director-General will preside.

It is hoped that officers will freely express their views on any points connected with the Fund which they may wish discussed. Those officers who wish for information on any special point are asked to communicate with the Hon. Secretary, Lieutenant-Colonel Skinner, at 68, Victoria Street, S.W., in order that facts and figures may be furnished in response to any question asked.

REGISTER FOR INDIAN SERVANTS.

Few officers on going to India have not experienced the difficulty of getting good servants. The discomforts on arrival and of a long journey up country, unprovided with a bearer, or, what is worse, provided with a hastily selected man, taken haphazard from the crowd of indifferent or bad characters who congregate in Bombay, have fallen to the lot of most of us; whilst the period of trial and vexation, until a proper staff of servants is secured, is familiar to us all.

In our Corps, with regular annual reliefs, it should not be difficult to arrange for an interchange. Officers leaving India would then be able to provide places for the good and tried retainers they are relinquishing, and new arrivals would, by taking on these men, be spared many of the worries and troubles which now befall them. Further, good servants would not be lost to the Corps, and the prospects of continuous employment could not fail to have attraction for the better class of men.

With these ends in view, officers due home from India are requested to communicate to the Journal particulars of servants whom they can recommend, so that officers going out in relief may have an opportunity of securing these men. The particulars required are:—

(1) Class of servant.
(2) Whether for bachelor or married officer.
(3) District or station to which he belongs.
(4) Any special recommendations.

Note.—The date the officer leaves India should also be stated, and when and where the servant will be available.

XVème CONGRES INTERNATIONAL DE MEDECINE (LISBONNE, 19-26 AVRIL, 1906).

We are requested to give publicity to the following notice:—

Le Comité exécutif du XVème Congrès International de Médecine s'est assuré un nombre considérable d'appartements (chambres à 1 lit, ou, pour la plupart, à plusieurs lits), au prix de 6, 8 et 10 francs par lit, suivant la catégorie. Il y a aussi quelques logements avec pension, à 15 francs par personne.

On payera les tickets à la gare du Rocio (entrée à Lisbonne en arrivant par chemin de fer) et pour la durée du Congrès, soit huit jours.

Il y a toute facilité pour les repas dans les restaurants et hôtels de Lisbonne, ainsi que dans le restaurant du Congrès.

Tous les logements seront distribués au fur et à mesure qu'arriveront les demandes: celles-ci sont à adresser, avant le 31 Mars, à Mr. Manoel José da Silva, Palacio Foz, Praça dos Restauradores, Lisbonne, qui est chargé de ce service.

L'affaire des voyages est définitivement réglée avec les chemins de fer français, espagnols et portugais qui permettent aux congressistes d'effectuer le voyage de retour par un itinéraire différent de celui de l'aller, toujours en bénéficiant de la réduction de 50 %, à condition que l'aller et le retour se fassent par voie ferrée.

Le Comité du Congrès commencera ces jours-ci avec l'envoi des cartes spéciales uniformes pour les compagnies de trois pays.

Nous apprenons en ce moment qu'aussi les chemins de fer italiens accordent la réduction de 50 %.

MARRIAGE.

CLARKE—ADAMS.—At St. George's Church, Agra, on February 15, 1906, by the Rev. W. Lorimer W. Kitching, M.A., Chaplain of Agra, Captain J. B. Clarke, R.A.M.C., to Violet Grace Seymour Adams, M.B., C.M.(Edin.).

DEATHS.

DWYER.—On January 1, at Kingstown, co. Dublin, Lieutenant-Colonel Charles Edward Dwyer, retired pay, late Royal Army Medical Corps, in his 56th year. He entered the service September 30, 1871; was promoted Surgeon March 1, 1873; Surgeon Major September 30, 1883; Surgeon-Lieutenant-Colonel September 30, 1891; and Brigade-Surgeon-Lieutenant-Colonel March 30, 1896. He retired on retired pay August 9, 1899.

HERBERT.—On March 2, at Plymouth, Honorary Deputy Surgeon-General Henry Carden Herbert, M.D., F.R.C.S.I., Brigade-Surgeon, retired Army Medical Staff, in his 73rd year. He entered the service September 15, 1857; was promoted Surgeon May 8, 1872; Surgeon-Major March 1, 1873; and Brigade-Surgeon December 9, 1882. He retired on December 21, 1887.

MACKAY.—On February 22, at Middelburg, Transvaal, Lieutenant Gordon Stewart Mackay, M.B., R.A.M.C., of septic pneumonia, in his 25th year. He entered the service on August 31, 1903, and embarked for South Africa December 24, 1904.

NOTICE TO SUBSCRIBERS.

Officers are particularly requested to give timely notice of changes of station or changes of address, in order to ensure the posting of the Journal to its correct destination.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, &c. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts and commands at home and abroad. All these communications should be written upon one side of the paper only, they should by preference be typewritten, but, if not, all proper names should be written in capital letters (or printed) to avoid mistakes, and be addressed to the Editor, Journal of the Royal Army Medical Corps, 68, Victoria Street, London, S.W.

Letters regarding subscriptions, non-delivery of the Journal, or change of address, should be sent to The Manager, Journal of the Royal Army Medical Corps, 68, Victoria Street, London, S.W.

Communications have been received from Surgeon-General A. M. Branfoot, C.I.E.; Lieutenant-Colonels C. Birt, H. A. Haines, W. G. Macpherson, C.M.G., R. J. S. Simpson, C.M.G., N. C. Ferguson, C.M.G., R. R. H. Moore, J. E. Nicholson (R.P.); Majors F. J. W. Porter, D.S.O., H. P. Johnson; Captains W. A. Ward, H. Herrick, A. E. Milner, H. R. Fuhr, D.S.O., L. W. Harrison, J. T. Clapham (H.P.), E. D. W. Greig, I.M.S., K. Steele (M.).

In the event of reprints of articles being required by the authors, notification of such must be sent when submitting the papers. Reprints may be obtained at the following rates, and other reprints at proportionate rates :—

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25	4	0	3	0	4	0	1	3	3	6	0	9
	8	0	5	6								
	16	0	9	6								
50	4	0	4	0	5	0	1	9	4	0	1	0
	8	0	6	9								
	16	0	12	0								
100	4	0	5	6	6	6	3	3	5	6	2	0
	8	0	9	0								
	16	0	16	9								
200	4	0	8	6	9	0	6	3	7	6	4	0
	8	0	13	6								
	16	1	3	6								

CASES FOR BINDING VOLUMES.—Strong and useful cases for binding can be obtained from the publishers at the undermentioned rates:—

Covers, 1*s.* 4*d.* net; binding, 1*s.* 2*d.*
These charges are exclusive of cost of Postage.

In forwarding parts for binding the name and address of sender should be enclosed in parcel.

The following periodicals have been received: *The Medical Record, The Medical News, New York Medical Journal, American Medicine, Gazette Med. de Paris, Archives de Medicine et de Pharmacie Militaires, Il Morgagni, Gazetta Medico-Italiana, The Medical Review, El Siglo Medico, Der Militärärzt, Deutsche Militärärztliche Zeitschrift, Anales de Sanidad Militar, Revue Med. de la Suisse Romande, La Medicina Militar Espanola, The Boston Medical and Surgical Journal, Annali di Med. Navale, Giornale del Regio Esercito, Le Caducée, The Hospital, The Ophthalmoscope, St. Thomas's Hospital Gazette, Bulletin de l'Acad. de Med. de Paris, Arch. Med. Belges, Voyenno Medisinskii, The Indian Medical Gazette, The Australasian Medical Gazette, Journal of the Association of Military Surgeons, U.S., Militärlagen ungvet af Militärlaegeforeningen, i Kjobenharn, The Veterinary Journal, The Practitioner, Public Health, Medical Review, The Army and Navy Gazette, The United Service Gazette, Journal of the Royal United Service Institution, The Johns Hopkins Press, The Health Resort and Journal of Spas and Sanatoria, Journal of the Royal Sanitary Institute, Journal of the U.S. Institution of India, Indian Public Health, Bulletin de l'Institut Pasteur, Records of the School of Medicine, Cairo, The Philippine Journal of Science.*

We desire to remind members who have not paid their third year's subscription, which was due on July 1, 1905, that it is very important that such should be promptly paid.

NOTICE.

The Corps News is now printed as an inset to the Journal and separate copies may be subscribed for, price 2d. monthly.

JOURNAL

OF THE

ROYAL ARMY MEDICAL CORPS.

Corps News.

May, 1906.

ROYAL ARMY MEDICAL CORPS—GAZETTE NOTIFICATIONS.

Colonel Blennerhasset M. Blennerhasset, C.M.G., F.R.C.S.I., retires on retired pay, dated April 4, 1906. He entered the Service March 30, 1872; was promoted Surgeon March 1, 1873; Surgeon-Major March 30, 1884; Surgeon-Lieutenant-Colonel March 30, 1892; Brigade-Surgeon-Lieutenant-Colonel July 4, 1896; and Colonel April 1, 1902. He served in the Ashanti Expedition, 1895-6, and was honourably mentioned. Star; C.M.G.

Lieutenant-Colonel George J. Coates, M.D., from half pay, to be Lieutenant-Colonel with precedence next below L. W. Swabey, dated March 13, 1906.

Captain Thomas C. MacKenzie, D.S.O., is seconded for service with the Egyptian Army, dated March 1, 1906.

MEMORANDA.

Lieutenant-Colonel W. G. Macpherson, C.M.G., Royal Army Medical Corps, is granted the next higher rate of pay of his rank, in recognition of the special services rendered by him when attached to the Japanese Forces operating in Manchuria during the recent Russo-Japanese Campaign.

The King has been pleased to give and grant unto the undermentioned officers His Majesty's Royal licence and authority to accept and wear the Decoration of the Imperial Ottoman Order of the Osmanieh, Fourth Class, conferred upon them by His Highness the Khedive of Egypt, authorised by His Imperial Majesty the Sultan of Turkey, in recognition of valuable services rendered to His Highness:—

Major John Herbert Rivers, Royal Army Medical Corps. Captain Hamilton George Frampton Stallard, Royal Army Medical Corps.

ARRIVALS HOME.—From India: Lieutenant-Colonels G. G. Adams, F. Daly; Major A. R. Aldridge; Captains J. B. Cantley, W. B. Fry, C. H. Furnival, J. Powell and L. Wood. From Mauritius: Lieutenant-Colonel E. North, and Captains J. G. Foster and G. E. F. Stammers. From South Africa: Lieutenant-Colonel R. I. D. Hackett. From West Africa: Captain E. W. W. Cochrane. From Malta: Captains A. R. C. Parsons and R. N. Woodley. From Crete: Captain T. White. From Gibraltar: Captain R. McK. Skinner.

ARRIVALS HOME ON LEAVE.—From India: Colonel A. W. P. Inman; Lieutenant-Colonel R. E. B. Morse; Majors C. W. Allport and G. Bent; Captains A. W. Gibson, J. F. Martin, and Lieutenants D. Ahern and C. Bramhall. From Gibraltar: Captain E. Brodribb. From South Africa: Lieutenant P. J. Hanafin.

EMBARKATIONS.—For India: Colonels R. H. Forman and O. E. P. Lloyd, V.C.; Captain R. Selby. For Malta: Majors J. G. McNaught, T. McCulloch and J. C. Weir. For South Africa: Major J. E. Carter and Captain J. C. B. Statham. For Jamaica: Lieutenant G. R. Painton.

POSTINGS.—Lieutenant-Colonel G. G. Adams to Maryhill. Lieutenant-Colonel T. Daly, Captains W. B. Fry, C. H. Furnival, J. V. Forrest, J. Powell and L. Wood to Eastern Command. Lieutenant-Colonel R. I. D. Hackett, Captain T. White and Lieutenant C. W. Holden to Southern Command. Major A. R. Aldridge to London District for temporary duty. Captains J. G. Foster and H. E. J. A. Howley to Irish Command. Captain J. B. Cantley to Northern Command. Captain G. E. F. Stammers to Western Command.

TRANSFERS.—Lieutenant-Colonel T. W. O'H. Hamilton, C.M.G., from Eastern Command to Aldershot Army Corps.

Lieutenant-Colonel J. M. Irwin from Aldershot to London District. Lieutenant-Colonel Sir A. A. Brooke-Pechell, Bart., from Southern Command to London District. Lieutenants J. A. Anderson and H. C. Sherren from London District to Southern Command.

The following Appointments have been approved: Lieutanant-Colonel J. M. Irwin to be Assistant Director-General in succession to Lieutenant-Colonel W. Babtie, V.C., C.M.G.

Major H. J. M. Buist, D.S.O., to be Deputy Assistant Director-General in succession to Major T. McCulloch.

Lieutenant-Colonel T. W. O'H. Hamilton, C.M.G., to be Staff Officer to Principal Medical Officer, Aldershot, in succession to Lieutenant-Colonel J. M. Irwin.

QUARTERMASTERS.

Quartermaster and Honorary Lieutenant J. Mathews arrived home April 5, with a view to retirement. He has been granted the honorary rank of Captain.

Quartermaster and Honorary Lieutenant W. J. Diggins arrived home April 5, with a view to retirement.

Quartermaster and Honorary Captain H. G. Hasell, has been transferred from Canterbury to Woolwich for duty.

Quartermaster and Honorary Lieutenant A. Morrison has been posted to Bulford for duty.

Quartermaster and Honorary Major E. Thowless has been placed upon retired pay.

LIST OF CASUALTIES:—

Transfers from other Corps.—*Nil.*

Transfers to other Corps.—4673 Quartermaster-Sergeant A. Paull, to Welsh Bearer Company, Cardiff, as Instructor; 7151 Quartermaster-Sergeant E. Dyer, to R.A.M.C. Volunteers, Woolwich, as Instructor; 19887 Private S. T. Westall, to Duke of Cornwall's Light Infantry; 19 Private G. F. Preedy, to Duke of Cornwall's Light Infantry; 19738 Private A. R. Brown, to 2nd Northumberland Fusiliers.

Transfers to Army Reserves.—11625 Corporal E. Wolseley, 18471 Private J. M. Hammond, 18476 Private F. G. Rodwell, 12356 Private W. Smith, 18489 Private G. Henderson, 18486 Private T. W. Huff, 18497 Private A. C. Dowe, 18499 Private J. Haveron, 18464 Private A. J. Wickersham, 18479 Private W. Burgess, 18500 Private H. Norris, 19134 Private W. Bradford, 18543 Private J. Lawson, 18546 Private J. B. Brady, 18573 Private R. Goble, 18572 Private C. J. Boyle, 18501 Private J. Cannell, 18510 Private E. W. Banyard, 18514 Private E. Raynell, 18522 Private E. E. Fielder, 18520 Private W. L. Hill, 18528 Private H. Kenyon, 18517 Private S. Silvey, 18531 Private E. Tracey, 18532 Private J. R. Ebery, 18537 Private A. Strong, 18544 Private E. T. Branchett, 11749 Private F. W. Larkin, 18558 Private W. McIntosh.

Promotions.—8260 Quartermaster-Sergeant F. Jones, to be Sergeant-Major, March 12, *vice* Sully, discharged; 7397 Quartermaster-Sergeant H. J. Ford, to be Sergeant-Major, March 12, *vice* Cooper, discharged; 7558 Quartermaster-Sergeant J. M. Rapson, to be Sergeant-Major, March 27, *vice* Greensill, discharged.

Deaths.—7126 Staff-Sergeant A. J. Treanor, at Guernsey, of pneumonia, on March 20, 1906.

Discharges.—6474 Sergeant-Major G. Grensill, termination of second period; 6591 Sergeant-Major H. R. Burrows, termination of second period; 3221 Staff-Sergeant J. Murray, after three months' notice; 8726 Sergeant V. B. Griffiths, medically unfit; 6062 Lance-Sergeant A. Smith, termination of second period; 10321 Corporal W. T.

Whale, termination of first period; 6442 Corporal G. H. Metchear, termination of second period; 8002 Private W. Martin, after eighteen years; 13053 Private O. Bresnahan, medically unfit; 10617 Private A. Threadkill, medically unfit; 6459 Private A. C. Gold, termination of second period; 6453 Private J. McQuade, termination of second period.

Departures for Abroad.—England to South Africa, per s.s. "Assaye," March 16: 8223 Sergeant-Major S. J. How; 17784 Private J. F. Stevens; 17376 Private F. Heenan; 15304 Private A. Perrior; 18967 Private W. Smith.

Arrivals Home from Abroad.—From Gibraltar to England, per s.s. "Dunera," March 13: 15619 Sergeant E. Preston.

From Ceylon to England, per s.s. "Ormez," February 24: 16945 Private H. I. Barkers.

From Malta to England, per s.s. "Dunera," March 13: 18032 Corporal J. T. Burns, 14959 Private P. G. Walton, 18947 Private R. J. Greaves, 18056 Private E. Yates, 18484 Private G. C. Scott, 17104 Private P. Harrison, 8002 Private W. Martin, 17099 Private J. B. Campbell, 12509 Private W. J. Waring.

From Jamaica to England, per s.s. "Port Royal," March 15: 6433 Sergeant-Major A. F. Tait.

From Egypt to England, per s.s. "Dunera," March 13: 11625 Corporal E. Wolseley, 16474 Private W. Towery, 16506 Private G. Lark.

From Gibraltar to England, per s.s. "Britannia," March 18: 7865 Private H. T. Martin.

From Gibraltar to England, per s.s. "Ortona," March 25: 14503 Sergeant G. Pottinger, 14578 Corporal G. B. Smith, 14621 Corporal R. Smith.

From Malta to England, per s.s. "Maine," April 1: 18371 Corporal H. Woods.

From Mauritius, per s.s. "Soudan," April 5: 10566 Staff-Sergeant B. C. Dring, 14926 Sergeant W. H. G. Hunt, 11000 Sergeant W. H. Storey, 14290 Sergeant W. H. Scott-Badcock, 16165 Corporal P. Bullough, 7906 Corporal J. Tuohy, 11929 Lance-Corporal W. J. Cooper, 14512 Lance-Corporal J. Widdal, 14068 Private R. Beck, 15026 Private H. E. Bishop, 17932 Private E. W. C. Bodley, 14282 Private C. Cull, 15433 Private J. L. Donnell, 16342 Private J. Fielding.

From South Africa, per s.s. "Soudan," April 5: 16473 Sergeant W. George, 15948 Sergeant G. D. Christie, 14770 Corporal A. Buckner, 12945 Corporal J. Whitley, 14526 Private H. A. Abrahart, 14453 Private J. Hay, 14337 Private G. Sadler, 12419 Private H. C. Holder, 14298 Private L. J. Light, 14619 Private O. T. Chandler, 14504 Private T. W. Sycklemore, 14468 Private J. Morris, 15032 Private W. H. Johnson, 12842 Private J. Hillen, 18134 Private S. C. Cox.

Special Extensions of Service beyond Twenty-one Years.—6440 Sergeant-Major F. W. Nelson, 6446 Sergeant-Major A. McNab, 6648 Quartermaster-Sergeant R. Hughs, 6827 Quartermaster-Sergeant W. Wooley, 7558 Quartermaster-Sergeant T. Healey, 6692 Quartermaster-Sergeant H. G. Miller, 6700 Quartermaster-Sergeant J. Wright, 6622 Quartermaster-Sergeant E. Ross, 6911 Staff-Sergeant A. Pitchforth, 7245 Staff-Sergeant T. Lever, 6859 Sergeant J. Walsh, 7134 Corporal A. E. Bowyer.

THE FOLLOWING HAVE QUALIFIED IN THE VARIOUS CORPS EXAMINATIONS FOR PROMOTION, &c.

For Sergeant-Major.—7553 Quartermaster-Sergeant J. M. Rapson, 7635 Quartermaster-Sergeant J. Ritchie.

For Quartermaster-Sergeant.—10815 Staff-Sergeant A. G. Audus.

For Staff-Sergeant.—9134 Sergeant H. Ladwick.

For Sergeant.—10675 Sergeant W. Richardson, 9130 Sergeant J. Buggey, 10892 Sergeant H. J. Reeve, 17843 Lance-Sergeant R. C. Blair, 10442 Lance-Sergeant C. Hunglison, 12443 Lance-Sergeant H. G. Burns, 12582 Corporal J. Whiting, 18613 Corporal C. F. Grant, 18149 Corporal A. H. Godfrey, 11728 Corporal T. J. Jarvis.

For Corporal.—15738 Private H. Brough, 17875 Private R. Walton, 14334 Private S. Rose, 15720 Private L. P. Thatcher, 18908 Private W. H. Dart, 10220 Private T. Azael, 14580 Private S. R. Gurnsey, 16824 Private P. Dewar, 12413 Private E. J. Russell, 15538 Private E. H. Jesson, 19126 Private F. H. Perkins, 14623 Private S. F. D. Davidson, 18181 Private W. A. Baker, 17385 Private W. Thornton, 18274 Private W. R. Nixon, 11210 Private D. Luker, 17108 Private H. Munro.

As Compounders.—9611 Corporal T. Newling, 8477 Corporal G. G. Gregson, 10518 Corporal E. G. I. Brice, 11370 Corporal F. Loveland, 12721 Corporal A. W. C. Baldwin, 18912 Corporal H. Dawson, 12653 Corporal F. C. Morrison, 12352 Corporal J. H.

Curtis, 12890 Corporal J. S. Gardiner, 14973 Corporal E. Lacey, 12025 Corporal A. E. Harrold, 12377 Corporal B. L. Aldhous, 12620 Corporal T. Kirby, 11396 Corporal H. E. Pell, 14465 Corporal R. Cotley, 18580 Lance-Corporal J. Kelly, 13314 Lance-Corporal D. Lochiel, 14072 Private R. R. Benham.

NOTES FROM THE CURRAGH.—Captain G. F. Sheehan, R.A.M.C., writes (April 12, 1906): "The following changes have occurred during the last two months.

"*Arrivals.*—Captain G. F. Sheehan (appointed Company Officer). Captain B. A. Craig, from Hong Kong, posted to this unit; he is at present in medical charge of Glen Imaal Camp.

"*Departures.*—Lieutenant F. C. Sampson, to Belfast; Lieutenant C. E. W. S. Fawcett, to Cork; Lieutenant A. E. T. Hastings, to Dublin; Lieutenant G. W. W. Ware, to Belfast.

Sergeant-Major G. Spring proceeded on furlough pending discharge to pension on expiration of twenty-two years and eighty-eight days' service, and five years' service as warrant officer. He is being relieved by Sergeant-Major F. Jones, from Preston, Northern Command.

"*Smoking Concert and Presentation.*—A smoking concert and presentation of an elaborate tea and coffee service to Sergeant-Major G. Spring, in celebration of his retirement from the service, was held on March 26, 1906, in the dining hall of the Royal Warwickshire Regiment, kindly lent for the occasion by the Officer Commanding that regiment. Most of the officers of the Company attended. The N.C.O.'s and men of the headquarters of the Company mustered in full force, and most of the N.C.O.'s and men of the various Detachments put in an appearance, which, with the attendance of Warrant Officers and senior N.C.O.'s from the various regiments and corps stationed here, went far to prove the popularity of Sergeant-Major G. Spring and also greatly augmented the success of the concert. After the first part of the programme had been got through, the Chairman (Quartermaster-Sergeant Pridgen) made the presentation to Sergeant-Major G. Spring, and on behalf of the Company expressed the esteem with which he was held by N.C.O.'s and men, and also the wish that his future might be prosperous and that he might live long to enjoy the use of the presentation. Sergeant-Major G. Spring's health was then drunk with musical honours. Sergeant-Major Spring responded, and in a few well-selected words expressed his pleasure at the honour of the occasion and also his regret that he could not take on for another seven years. He thanked the Company one and all for their kind appreciation of his services. A toast to the Officers was then proposed by the Chairman, which was heartily responded to by N.C.O.'s and men. Captain Gunter responded on behalf of the Officers and expressed his hopes that the future career of Sergeant-Major Spring might be as prosperous as was his past in the Corps. The Chairman then proposed the "Visitors," whose health was drunk with musical accompaniment. Sergeant-Major Rush, A.S.C., responded on behalf of the visitors, and spoke of the respect with which Sergeant-Major Spring was held by his past services in the camp. After Sergeant-Major Spring had said a few words in acknowledgement of all the good wishes that had been expressed, the second part of the programme was proceeded with, and at the conclusion of the concert the company joined hands and sang "Auld Lang Syne.' A most enjoyable evening was terminated by the singing of the National Anthem, after which Sergeant-Major Spring was carried shoulder high from the room."

PROGRAMME.

Part I.

1.	"Mona"	Private BOWMAN (R.A.M.C.)
2.	"9½d. an Hour"	Private STEWART (11th Hussars)
3.	"Annie Laurie"	Private BURNS (R.A.M.C.)
4.	"Little Wooden Hut"	Private MINNS (R.A.M.C.)
5.	"In Friendship's Name"	Private FREEMANTLE (A.O.C.)
6.	"Nothing New"	Private KOESTER (11th Hussars)
7.	"Shift up a Little Bit Further"	Private BIGNELL (R.A.M.C.)
8.	"Queen of the Earth"	Sergeant OCKENDEN (11th Hussars)
9.	"I Tickled Him"	Private KENNY (E. Lancs.)
10.	"Every little Doggie has his Day"	" " (*encore.*)
11.	"Star of my Soul"	Private FREEMANTLE (A.O.C.)
12.	"Salvation Ball"	Sergeant ELMS (R.E.)

PRESENTATION, &c.

Part II.

13.	"Mary Jane"	Sergeant ELMS (R.E.)
14.	"Killarney"	Sergeant OCKENDEN (11th Hussars)
15.	"Oh! Oh! Oh!"	Private STEWART (11th Hussars)
16.	"Same Old Moon"	Corporal SPECK (R.A.M.C.)
17.	"Song that Reached my Heart"	Staff-Sergeant TULK (A.S.C)
18.	"Powder Monkey Little Jim"	Sergeant-Major SPRING (R.A.M.C.)
19.	"Gilded Cage"	Corporal NEWTON (R.F.A.)
20.	"Comrades"	Corporal POLLARD (R.A.M.C.)
21.	"Eileen Asthore"	Quartermaster-Sergeant PRIDGEN (R.A.M.C.)
22.	"Penny Whistle"	Sergeant ELMS (R.E.)
23.	"Getting it by Degrees"	,, ,, (*encore*)
24.	"Ora Pro Nobis"	Sergeant OCKENDEN (11th Hussars)

"Staff-Sergeant Record, A.S.C., and Private Marshall, R.A.M.C., ably officiated at the piano."

NOTES FROM DEVONPORT.—Major Vesey Davoren, R.A.M.C., writes (March 31, 1906): "Major A. Wright arrived from Falmouth for duty on March 16, 1906, having been relieved at that station by Lieutenant-Colonel G. J. Coates, appointed to Medical charge of troops, Falmouth, from half pay. Captain Walton arrived here for duty on March 22, 1906, on return from Barbados. Captain Carlyon, Lance-Corporal Stewart, and Privates Stevenson and Cook proceed to Okehampton Camp, which opens about the middle of April. Captain E. Bennett proceeds to Exeter on April 2, 1906, to relieve Major S. N. Cardozo, retired pay, who has been granted leave. Quartermaster-Sergeant Crighton arrived from Netley on February 26, 1906, having been invalided from Malta, and has been granted two months' sick furlough. Quartermaster-Sergeant Varley and Staff-Sergeant Moore have been transferred to Horfield and Taunton, respectively, and Quartermaster-Sergeants Plunket and Carter, on being relieved by them, are posted to Headquarters at Devonport. Quartermaster-Sergeant Taylor is posted here on arrival home from Singapore. Sergeant Starkie is posted to Bodmin, and Quartermaster-Sergeant Ryan, on being relieved by him, returns to Headquarters.

"A most successful Concert was given in the Military Hospital Theatre on March 22, 1906, for the amusement of the patients. The Royal Army Medical Corps Officers, N.C.O.'s and men, and their civilian friends, contributing a very excellent programme. Private McCristal, Q.A.I.M.N.S., gave a very dramatic rendering of 'Kissing Cup,' and the phonograph was introduced into our programme for the first time, and appeared to be a great success.

"Our Officers' Tennis Club is to be started again this year, on May 1, one of the courts having been relaid, and it is hoped the grounds will be in very good order soon."

ROYAL ARMY MEDICAL CORPS DANCE.

The following description is from the *Western Morning News* of March 31, 1906: "A dance was given last evening at the Foresters' Hall, Plymouth, by the 7th Company Royal Army Medical Corps, stationed at the Military Hospital, Devonport. Among those who accepted invitations were: Major V. H. W. Davoren, Captains F. F. Carroll, A. F. Carlyon, A. E. Bennett and H. G. B. Walton, Captain and Quartermaster F. Crooks, and Lieutenant and Quartermaster J. Green. Over 200 guests were present, including a large number of N.C.O.'s and men of regiments and ships. The hall was nicely decorated, and the programme included several of the latest dances, music being supplied by a string band, under Mr. F. Bright. The dance was a great success, which was partly due to the energetic work of the Committee, which consisted of Quartermaster-Sergeant Varley, Sergeant Longman, Corporal Burden, Lance-Corporal Johnson and Privates McDonald, Sedgley and Daly. The M.C.'s were Messrs. J. C. Crane and A. Sitters, assisted by the Committee. Refreshments were supplied by Mr. Claude Avory, of the West India House, Stonehouse."

NOTES FROM PORTSMOUTH.—Captain M. P. Corkery, R.A.M.C., writes (April 4, 1906): "*Portsmouth Military Medical Society.*—A meeting of the Officers, Royal Army Medical Corps, stationed at Portsmouth, was held in the Military Hospital, Portsmouth, on October 26, 1905, at which the desirability of forming the above Society was considered. It was decided unanimously to form a small Society, at which papers should be read on matters connected with the Royal Army Medical Corps in war, in tropical countries, &c., and that the Society should meet once a month during the winter months for this purpose. Colonel Morris, R.A.M.C., Administrative Medical Officer, Ports

mouth District, was elected President, and Lieutenant-Colonel Thomson, R.A.M.C., Honorary Secretary. During the past months interesting papers have been read by the following officers, and discussions have followed each paper: Major Eckersley, R.A.M.C., 'Modern Treatment of Venereal Diseases, particularising the Vienna System.' Civil Surgeon D'Arcy Hamilton, 'Diphtheria.' Captain Lelean, R.A.M.C., 'Bilharzia Hæmatobia.' Lieutenant-Colonel Harwood, R.A.M.C., 'Cholera.'"

NOTES FROM BANGALORE.—The following transfers have lately taken place to and from the Station: Lieutenant-Colonel B. T. McCreery has taken over Command on arrival from England. Lieutenant-Colonel P. C. H. Gordon has been transferred to Poonamallee. Lieutenant-Colonel W. L. Reade and Lieutenant W. Parsons have arrived from England. Captain G. B. Carter has been transferred to Wellington, and Captain R. V. Cowey to Secunderabad. Lieutenant R. H. Bridges has been transferred to Madras. Lieutenant H. C. Hildreth has arrived from Madras.

At a special Mess meeting Lieutenant D. P. Johnstone was elected Mess Secretary, *vice* Lieutenant R. H. Bridges.

On February 7, H.R.H. the Prince of Wales paid a visit to the Station Hospital and was shown round the wards by Lieutenant-Colonel McCreery. The Prince expressed surprise at the absence of an operating room, with the result that there are at last signs that the long-promised operating room will soon be an accomplished fact.

At the recent Gymkhana Hockey Club Tournament, the Station Hospital team were the runners up, and made an excellent fight in the final against the Bangalore Rifle Volunteers. Considering the small number of men we have to draw from, we may congratulate ourselves upon having reached the final, in which we were beaten by the Bangalore Rifle Volunteers by 4 goals to 1.

Great interest is taken here in the proposed improvement of the Band. We were sorry to see that there is no likelihood that the Band will be officially recognised, at all events in the near future. As regards the condition of the Band Fund, every one here would be delighted to increase their subscriptions; if the feeling is the same in other stations there should be no difficulty in having a Band Fund as large as that of any corps in the service.

NOTES FROM BLOEMFONTEIN.—Major S. F. Clark, R.A.M.C., writes (March 3, 1906): "Things have been quiet here lately.

"In connection with our sports, which were held in January, I should like to allude to the kindly feeling shown to us by the Norfolk Regiment, who refused to make any charge for their band, and said they would like us to consider its services as a slight return from all ranks for what we did for them when they were in trouble. They were also good enough to say that our sports were the best thing of its kind yet held.

"We played three cricket matches during the month, with the customary result in each case. Against the 17th Brigade of Field Artillery we ran up our largest score, 161, but our opponents reached 189. We had a capital finish, as they were still 4 runs behind when their last man came in, but our bowlers could make no impression on Lieutenant White, who scored 122 not out. Our total came chiefly from a welcome 39 from Major Hinde, an unexpected 32 from Private Rose, and a customary 21 from Lieutenant Le Bas. Against the 5th Dragoon Guards we fared badly. Thanks to Private Pollard (16), Lieutenant Le Bas (23), and Major Hinde (38), we had 75 up at one time for the loss of only one wicket, although we were opposed to men who bowl for the garrison; but at this point the innings turned itself into a procession of unemployed batsmen. Major Clark contributed 26 not out. We totalled 129, and our opponents 200 for 4 wickets. Against the Norfolk Regiment, Major Clark made 29, Lieutenant Le Bas got hurt and so contributed only 5, while the procession this time moved so rapidly that Major Hinde had only time to make 8 not out. At one time only 3 wickets were down for 47, but the innings closed for 50. Our opponents, however, only made 66."

NOTES FROM CAIRO.—Major C. K. Morgan, R.A.M.C., writes (April 8, 1906): "The Detachment of the Royal Army Medical Corps stationed at Cairo paraded in Review Order on 19th ult. to witness the presentation of the special bronze badges of Q.A.I.M.N.S. to No. 12547 Private A. Triggs, and No. 16762 Private F. Price, who have been recently admitted into that Service. Colonel J. Magill, C.B., P.M.O. in Egypt, presented the men with their badges, and congratulated them on the high standard of efficiency they had attained in the Corps, and on the distinction which had been conferred on them.

"Colonel Magill, C.B., P.M.O. in Egypt, recently gave a most interesting lecture at Headquarters, entitled 'Notes on Preparations for Campaigning.' The lecture

was attended by Brigadier-General Bullock, C.B., Commanding the Army of Occupation, and by the officers of the garrison. Major Erskine returned from four months' sick leave on 11th ult., and has been posted to Alexandria for duty. Major Hardy, Sanitary Officer, left Cairo for four months' leave on private affairs on 21st ult., with the intention of spending the first part of his leave in Italy and Switzerland, before proceeding to England. Captain Riach, D.P.H., is acting for him during his absence. Major Morgan was S.M.O. of the annual manœuvres which took place between the 12th and 15th ult., in the neighbourhood of Khatatba.

"Sergeant-Major Fry and thirty-three rank and file arrived in Egypt on February 23 to augment the strength of the Detachment in this Command.

"At the Cairo Annual Lawn Tennis Tournament, which took place in March, Major Stanistreet won the Championship Singles, and he and Mr. Mackintosh won the Open Doubles."

NOTES FROM MAURITIUS.—Lieutenant-Colonel A. Peterkin, R.A.M.C., notifies the following embarkations (February 27, 1906): "The following officers and non-commissioned officers and men embarked on H.M. H. T. 'Soudan,' for passage to England, on the 26th instant, tour of service abroad expired, viz.: Lieutenant-Colonel E. North, R.A.M.C., Captain G. E. F. Stammers, R.A.M.C., Captain J. G. Foster, R.A.M.C., 10566 Staff-Sergeant B. C. Dring and wife, 14926 Sergeant W. H. G. Hunt, 11000 Sergeant W. H. Storey, 14290 Sergeant W. H. Scott-Badcock, 16165 Corporal P. Bullough, 7906 Corporal J. Tuohy, 11929 Lance-Corporal W. J. Cooper, 14512 Lance-Corporal J. Widdal, 14068 Private R. Beck, 15026 Private H. E. Bishop, 17932 Private E. W. C. Bodley, 14282 Private C. Cull, 15433 Private J. L. Donnell, 16342 Private J. Fielding."

NOTES FROM SIMLA (INDIA).—Captain E. Blake Knox, R.A.M.C., Secretary to Principal Medical Officer, His Majesty's Forces in India, writes (March 22, 1906):—

"*Appointments.*—Lieutenant-Colonel P. C. H. Gordon, to command Station Hospital, Poonamallee. Lieutenant-Colonel W. W. Pike, D.S.O., to command Station Hospital, Maymyo. Lieutenant-Colonel G. Cree, to command Station Hospital, Wellington. Lieutenant-Colonel C. W. Thiels, to command Station Hospital, Bellary. Lieutenant-Colonel W. A. Morris has been appointed to the command Station Hospital, Murree, *vice* Lieutenant-Colonel C. C. Reilly, R.A.M.C., vacated. Major A. Y. Reilly, to command Station Hospital, Mandalay. Major J. Edye, to command Station Hospital, Cawnpore. Major H. P. Johnson, to command Station Hospital, Benares. Captain D. J. F. O'Donoghue, to Station Hospital, Aden, for duty.

"*Postings.*—The following hill station appointments have been approved for the Summer season of 1906: Lieutenant-Colonel R. G. Hanley, to command of the Station Hospital, Kuldanna. Lieutenant-Colonel S. G. Allen, to command of the Station Hospital, Kalabagh. Major G. Scott, to command of the Station Hospital, Gharial. Major R. Holyoake, to command of the Station Hospital, Solon. Major T. W. Gibbard, to command of the Station Hospital, Barian Camp. Captain F. S. Walker, to command of the Station Hospital, Khyra Gali, in addition to the Medical charge of the School of Musketry, Changla Gali. Major O. R. A. Julian, C.M.G., to command of the Station Hospital, Cherat. Captain H. W. Long, to command of the Station Hospital, Upper Topa. Lieutenant S. M. W. Meadows, to command of the Station Family Hospital, Cliffden. Lieutenant J. A. Turnbull, to command of the Station Hospital, Khanspur. Lieutenant H. T. M. Wilson, to command of the Station Hospital, Lower Topa. Lieutenant R. H. L. Cordner, to command of the Station Hospital, Bara Gali. Lieutenant A. W. Gater, to command of the Station Hospital, Ghora Dhaka. On arrival from England the undermentioned officers have been posted to the Station Hospitals noted against their names. Lieutenant-Colonel S. F. Freyer, to Bangalore. Lieutenant W. Parsons, to Bangalore; Lieutenant J. E. Hoar, to Secunderabad; Lieutenant E. M. Pennyfather, to Wellington; Lieutenant J. P. Lynch, to Barrackpore; Lieutenant W. G. Maydon, to Agra; Lieutenant G. Churchill, to Lucknow; Lieutenant W. J. Nealor, to Meerut; Lieutenant A. A. McNeight, to Lucknow; Lieutenant F. J. Turner, to Deolali; Lieutenant G. G. Tabuteau, to Jhansi; Lieutenant R. E. Humphery, to Poona.

"*Leave.*—The undermentioned officers have been granted leave out of India: Lieutenant-Colonel G. E. Hale, for six months, from May 11, 1906. Captain M. C. Beatty, for six months, from March 15, 1906. Lieutenant C. Bramhall, for six months, from March 7, 1906.

"*Embarkations.*—The undermentioned officers sailed for England, tour expired: Major A. R. Aldridge, Captains L. Wood and J. Powell, on March 7, 1906. Major T. Daly, Captains C. H. Furnivall, J. B. Cautley and W. B. Fry, on March 16, 1906."

NOTES FROM STANDERTON, TRANSVAAL, SOUTH AFRICA (March, 1906).—Captain L. Addams-Williams, R.A.M.C., during January, February and March, 1906, delivered a course of five lectures on Hygiene in the large new gymnasium of the Cantonments to the Officers and N.C.O.'s of the garrison.

15096 Corporal J. E. Pugh, R.A.M.C., 15437 Corporal C. A. Wilkinson, R.A.M.C., have passed a satisfactory examination as Compounders of Medicines at this station.

Miss K. Pearse, Q.A.I.M.N.S., took over the duties of acting Matron to the hospital from March 5, 1906.

At a meeting of the Sports Club on March 14, Corporal Pugh was elected Captain, Corporal H. B. Mason Vice-Captain, and Corporal A. J. C. Hendrie Secretary to the Detachment Football Club. Captain L. Addams-Williams, Captain, and Lance-Corporal E. J. Barnes, Vice-Captain of the Hockey Club.

Corporal A. J. C. Hendrie has been appointed Clerk to the Senior Medical Officer.

The following is the result of the R.A.M.C. Standerton Cricket Season, 1905-1906. Strength, 36 N.C.O.'s and men.

FIRST ELEVEN MATCHES.

	Played.	Lost.	Won.	Drawn.
6th Batt. Mounted Infantry ..	3	2	1	—
A.S.C. and R.E.	3	1	1	1
83rd Battery, R.F.A.	2	—	2	—
Heidelburg Town	1	1	—	—
3rd Batt. R. Warwick Regt. ..	2	2	—	—
R.A.M.C., Pretoria	1	—	1	—
Total ..	12	6	5	1

Ten minor matches were also won.

BATTING AVERAGES.

Captain L. Addams-Williams	30
Private Light	28
Sergeant-Major G. Greensill..	17
Sergeant Newhouse	16
Private Johnson	10
Private Hillen	9

Lieutenants F. C. Lambert, S. E. Lewis, and G. S. Mackay, R.A.M.C., visited and played for R.A.M.C., Pretoria, on December 13, 1905.

SCORES.

R.A.M.C., Standerton, 1st innings	163
R.A.M.C., Pretoria, ,, ,, ...	54
,, ,, 2nd innings	49

The following composed our First Eleven: Captain Addams-Williams, Sergeant-Major G. Greensill, Sergeant Newhouse, Sergeant Bangert, Corporal Pugh, Corporal Whitley, Private Hillen, Private Wellington, Private Light, Private Johnson, Private Dellar. Private S. J. Light completed his thousand runs during the season.

14369 Sergeant E. Newhouse, 14349 Private H. E. Aprile, 12447 Private W. Reynolds, R.A.M.C., left Standerton on January 6, 1906, for embarkation to England, tour expired, in the s.s. "Dilwara," from Cape Town.

Miss M. Steenson, Q.A.I.M.N.S., Acting Matron; 15948 Sergeant G. D. Christie, Clerk to the Senior Medical Officer, 12954 Corporal J. Whitly, 14526 Private H. Abrahart, 12842 Private J. Hillen, 15032 Private W. H. Johnson, our electrician, and 14298 Private S. J. Light, R.A.M.C., one of our best cricketers, all left Standerton on March 5, 1906, for embarkation on the s.s. "Soudan," *en route* to England from Durban.

We were all grieved to hear of the dangerous illness and death at 8.50 p.m., on February 22, 1906, in the Military Hospital, Middelburg, Transvaal, of Lieutenant G. S. Mackay, M.B., R.A.M.C. This popular young officer has twice recently visited us here. On the first occasion on July 11, 1905, when he proceeded in Medical charge of the 2nd Battalion Royal Garrison Regiment, remaining officers, N.C.O.'s and men, to Bloemfontein, and on the second, when he played for the R.A.M.C. Cricket XI., from Pretoria, on December 13, 1905, in the match recorded in the notes here given.

On February 14, 1906, H.R.H. the Duke of Connaught and Strathearn, the

Duchess, and Princess Patricia made an inspection of the Military Hospital, Standerton, and the Duke said he was well satisfied.

QUEEN ALEXANDRA'S IMPERIAL MILITARY NURSING SERVICE.

Miss C. H. Keer, R.R.C., Principal Matron, has arrived home from South Africa to take up the appointment of Matron-in-Chief at the War Office, vacated by Miss Sidney Brown, R.R.C.

Miss F. E. Addams-Williams, R.R.C., Matron, Royal Victoria Hospital, Netley, has proceeded to Pretoria as Principal Matron in South Africa.

Postings and Transfers.—Matrons: Miss A. B. Smith, R.R.C., to Royal Victoria Hospital, Netley, from Royal Infirmary, Dublin; Miss A. L. Cox, to Military Hospital, Shorncliffe, on return from trooping duty, s.s. "Plassy." Sisters: Miss S. L. Wilshaw, R.R.C., to Military Hospital, Cairo, Egypt, from Military Hospital, Khartoum; Miss M. M. Blakely, to Military Hospital, Cairo, Egypt, from Military Hospital, Khartoum; Miss W. G. Massey, to Military Hospital, Khartoum, from Military Hospital, Cairo; Miss D. M. Taylor, to Egypt, from Royal Infirmary, Dublin; Miss E. J. M. Keene, to Royal Infirmary, Dublin, from Military Hospital, York; Miss L. M. Culverwell, to Military Hospital, York, from the Queen Alexandra Military Hospital, Millbank; Miss S. Smyth, to Cambridge Hospital, Aldershot, on return from trooping duty, s.s. "Plassy"; Miss S. K. Bills, to the Queen Alexandra Military Hospital, Millbank, on return from trooping duty, s.s. "Plassy." Staff Nurses: Miss E. Barber, to Military Hospital, Gibraltar, from Military Hospital, Malta; Miss E. M. Fairchild, to Royal Victoria Hospital, Netley, on return from trooping duty, s.s. "Plassy"; Miss A. B. Cameron, to the Queen Alexandra Military Hospital, Millbank, on return from South Africa; Miss M. S. Ram, to the Cadets' Hospital, Royal Military College, Sandhurst, from the Queen Alexandra Military Hospital, Millbank; Miss A. J. St. Clair, to Royal Victoria Hospital, Netley, on appointment; Miss A. M. Phillips, to Royal Victoria Hospital, Netley, on appointment; Miss D. M. Smith, to Military Hospital, Portsmouth, on appointment; Miss G. A. Aitchison, to Military Hospital, York, on appointment; Miss A. E. Fitzgerald, to Military Hospital, Gibraltar, from Military Hospital, York; Miss K. M. Bulman, to Military Hospital, Malta, from Military Hospital, Portsmouth; Miss M. E. Wilkins, to Military Hospital, Malta, from Royal Victoria Hospital, Netley; Miss A. M. MacCormac, to Military Hospital, Malta, from Royal Victoria Hospital, Netley; Miss E. G. Barrett, to Military Hospital, Portsmouth, from Royal Infirmary, Dublin; Miss G. M. Smith, to Military Hospital, Khartoum, from Military Hospital, Cairo.

Appointment Confirmed.—Staff Nurse: Miss M. M. A. McCreery.

Arrivals.—Miss M. Steenson, Sister, from South Africa.

ARMY MEDICAL RESERVE OF OFFICERS.

Surgeon-Captain James A. Clark, M.B., to be Surgeon-Major, dated March 3, 1906.

Surgeon-Lieutenant-Colonel Robert T. C. Robertson, M.B., having resigned his commission in the Volunteers, ceases to belong to the Army Medical Reserve of Officers, dated April 4, 1906.

Surgeon-Lieutenant Francis E. Freemantle, M.B., Herts Imperial Yeomanry, to be Surgeon-Captain, dated April 7, 1906.

ROYAL ARMY MEDICAL CORPS (MILITIA).

Robert Arthur O'Donovan, Gent., to be Lieutenant, dated March 24, 1906.

ROYAL ARMY MEDICAL CORPS (VOLUNTEERS).

Northern Command; Manchester Companies.—Alfred Ernest Royse, Gent., to be Quartermaster, with the honorary rank of Lieutenant, dated March 31, 1906.
Quartermaster, with the honorary rank of Lieutenant, dated April 7, 1906.

Scottish Command: Aberdeen Companies.—David Hutchson Duthie, Gent., to be

Scottish Command: Glasgow Companies.—Robert Buchanan Carslaw, Gent., to be Lieutenant, dated April 7, 1906. Lieutenant R. B. Carslaw is appointed Transport Officer, dated April 7, 1906.

North-east Lancashire Bearer Company.—Alexander Callam, Gent., to be Lieutenant, dated March 28, 1906.

Scaforth and Cameron Bearer Company.—Captain J. Macdonald, M.B., to be Major, dated March 31, 1906.

OTHER VOLUNTEER CORPS.

1st *Argyll and Bute Royal Garrison Artillery* (*Volunteers*).—Andrew Currie, M.B., to be Surgeon-Lieutenant, dated March 24, 1906.

3rd *Durham Royal Garrison Artillery* (*Volunteers*).—Surgeon-Major James Drummond, M.B., to be Lieutenant-Colonel, and to command under the conditions of Paragraph 47, Volunteer Regulations, dated March 24, 1906.

1st *Devonshire and Somersetshire Royal Engineers* (*Volunteers*).—Leonard Robert Fosswell, Gent., to be Surgeon-Lieutenant, dated March 24, 1906.

7th *Volunteer Battalion, The Royal Scots* (*Lothian Regiment*).—John Frank Crombie, Gent. (late Captain), to be Surgeon-Lieutenant, dated March 24, 1906.

1st *Volunteer Battalion, The Buffs* (*East Kent Regiment*).—Surgeon-Lieutenant E. G. Moon resigns his Commission, dated March 24, 1906.

1st *Volunteer Battalion, Alexandra, Princess of Wales' Own* (*Yorkshire Regiment*).—Clarence Barns Whitehead, Gent., to be Surgeon-Lieutenant, dated March 24, 1906.

1st *Volunteer Battalion, The Royal Welsh Fusiliers*.—Jonas William Anderson, M.B., to be Surgeon-Lieutenant, dated March 24, 1906.

2nd *Lancashire Royal Garrison Artillery* (*Volunteers*).—Harry Armitage Robinson, M.D., to be Surgeon-Lieutenant, dated March 28, 1906.

2nd *Volunteer Battalion, The South Staffordshire Regiment*.—Surgeon-Lieutenant C. S. S. Rigby resigns his Commission, dated March 28, 1906.

1st (*Hallamshire*) *Volunteer Battalion, The York and Lancaster Regiment*.—Christopher Addison, Gent. (late Captain), to be Surgeon-Lieutenant, dated March 28, 1906.

1st *Edinburgh* (*City*) *Royal Garrison Artillery Volunteers*.—James Hunter Harvey Pirie, Gent. (formerly Second Lieutenant, Royal Field Artillery), to be Surgeon-Lieutenant, dated March 31, 1906.

1st *Sussex Royal Engineers* (*Volunteers*).—Surgeon-Captain A. H. Croucher, M.D., resigns his Commission, dated March 31, 1906.

The Queen's Rifle Volunteer Brigade, The Royal Scots (*Lothian Regiment*).—Surgeon-Captain J. A. Clark, M.B., to be Surgeon-Major, dated March 31, 1906.

2nd *Volunteer Battalion, The Northumberland Fusiliers*.—Supernumerary Surgeon-Lieutenant F. N. Grinling (Commanding Tyne Volunteer Infantry Brigade Bearer Company) to be Surgeon-Captain, remaining supernumerary, dated March 31, 1906.

20th *Middlesex* (*Artists'*) *Volunteer Rifle Corps*.—Surgeon-Captain C. S. de Segundo, M.B., is granted the honorary rank of Surgeon-Major, dated March 12, 1906.

2nd (*Leeds*) *Yorkshire* (*West Riding*) *Royal Engineers* (*Volunteers*).—Surgeon-Lieutenant J. Holmes to be Surgeon-Captain, dated April 7, 1906.

1st *Dumbartonshire Volunteer Rifle Corps*.—John Allan, M.B., to be Surgeon-Lieutenant.

ROYAL SCHOOL FOR THE DAUGHTERS OF OFFICERS OF THE ARMY.

ELECTION, JUNE, 1906.

THE Director-General would be glad if officers, who may have a vote or votes at their disposal, in connection with the Royal School for the Daughters of Officers of the Army, would support the claims of GERALDINE EVA PEARD (nine years of age), daughter of the late Lieutenant-Colonel H. J. Peard, C.M.G., R.A.M.C.

Lieutenant-Colonel Peard was a distinguished officer of our Corps, and after serving throughout the South African War he died at Middelburg, Cape Colony (after only three days' illness), from malignant scarlet fever, contracted in his attendance on cases of the disease.

Officers may perhaps be able to render assistance in this case by securing the support of any friends they may have among subscribers.

Communications in this matter should be addressed to The Manager, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, 68, Victoria Street, London, S.W.

SCHOLASTIC.

MRS. PEARD (widow of Lieutenant-Colonel H. J. Peard, C.M.G., R.A.M.C.) is opening a boarding house, in connection with a high-class school, at Surbiton (head mistress, Miss Procter, daughter of the late Major-General Montagu Procter, B.S.C.).

ROYAL SOLDIERS' DAUGHTERS' HOME, HAMPSTEAD.

In the list of candidates for admission by vote to this institution are two daughters of Sergeant Barnes, R.A.M.C., and an orphan of a Staff-Sergeant, R.A.M.C. Arrangements are being made for the admission of the latter, Hannah I. J. A. Chaplain, to the Home as a boarder, at the charge of the Charitable Schools Fund. Those officers of the R.A.M.C. who have votes in this institution are therefore recommended by the Chairman of the Royal Army Medical Corps Fund Committee to give them in favour of Dorothy Pieste Barnes, the elder of the two daughters of Sergeant Barnes, R.A.M.C.

THE ROYAL ARMY MEDICAL CORPS FUND.

Notice of Fourth General Meeting.

The Fourth General Meeting of Subscribers to this Fund will be held in the Theatre of the Royal United Service Institution on Monday, June 18, 1906, at 3 p.m. The Director-General will preside.

It is hoped that officers will freely express their views on any points connected with the Fund which they may wish discussed. Those officers who wish for information on any special point are asked to communicate with the Hon. Secretary, Lieutenant-Colonel Skinner, at 68, Victoria Street, S.W., in order that facts and figures may be furnished in response to any question asked.

Agenda.

Lieutenant-Colonel A. B. Cottell has given notice that he will, seconded by Colonel A. T. Sloggett, move "That the R.A.M.C. resume its custom of inviting Corps guests to the Annual Dinner."

REGISTER FOR INDIAN SERVANTS.

Few officers on going to India have not experienced the difficulty of getting good servants. The discomforts on arrival and of a long journey up country, unprovided with a bearer, or, what is worse, provided with a hastily selected man, taken haphazard from the crowd of indifferent or bad characters who congregate in Bombay, have fallen to the lot of most of us; whilst the period of trial and vexation, until a proper staff of servants is secured, is familiar to us all.

In our Corps, with regular annual reliefs, it should not be difficult to arrange for an interchange. Officers leaving India would then be able to provide places for the good and tried retainers they are relinquishing, and new arrivals would, by taking on these men, be spared many of the worries and troubles which now befall them. Further, good servants would not be lost to the Corps, and the prospects of continuous employment could not fail to have attraction for the better class of men.

With these ends in view, officers due home from India are requested to communicate to the Journal particulars of servants whom they can recommend, so that officers going out in relief may have an opportunity of securing these men. The particulars required are:—

(1) Class of servant.
(2) Whether for bachelor or married officer.
(3) District or station to which he belongs.
(4) Any special recommendations.

Note.—The date the officer leaves India should also be stated, and when and where the servant will be available.

LIST OF OPERATIONS PERFORMED IN MILITARY HOSPITALS IN THE UNITED KINGDOM DURING THE YEAR 1905.

Operations	Number of cases	Result			
		Completely successful	Partially successful	Failed	Died
Laparotomy	31	21	1	1	8
Pylorectomy	1	1	—	—	—
Gastro-enterostomy	1	1	—	—	—
Suture of intestines	2	1	—	1	—
Enterectomy	1	—	—	—	1
Excision of vermiform appendix ..	37	37	—	—	—
Colotomy	1	1	—	—	—
Intestinal obstruction	2	1	—	—	1
Closure of fæcal fistula	1	1	—	—	—
Radical cure of hernia	322	320	1	1	—
Abscess of liver	25	17	2	—	6
Aspiration for abscess of liver ..	4	1	—	2	1
Aspiration for inflammation of liver	1	1	—	—	—
Exploration of liver	9	9	—	—	—
Puncture of kidney	1	—	1	—	—
Nephrotomy	2	2	—	—	—
Nephrectomy	1	1	—	—	—
Nephro-lithotomy	1	1	—	—	—
Removal of kidney	1	—	—	—	1
For suspected calculus	1	—	1	—	—
Fistula in ano	26	24	—	2	—
For anal fissure	5	5	—	—	—
Stricture of rectum	1	—	1	—	—
Hæmorrhoids	59	59	—	—	—
Removal of growth (papilloma) ..	3	3	—	—	—
Exploratory examination	1	1	—	—	—
Tapping of bladder with trocar ..	1	1	—	—	—
Lithotomy	1	1	—	—	—
Dilatation of urethra	6	6	—	—	—
Plastic operation	3	3	—	—	—
Wheelhouse's operation	3	3	—	—	—
Internal urethrotomy	3	3	—	—	—
External urethrotomy	3	2	1	—	—
Incision of prepuce (circumcision)..	96	96	—	—	—
Amputation of penis, partial ..	1	1	—	—	—
Undescended testes	2	2	—	—	—
Scraping of penis	1	1	—	—	—
Excision of growth (papilloma) ..	4	4	—	—	—
Varicocele	85	84	1	—	—
Hydrocele	28	25	1	2	—
Radical cure, hydrocele and varicocele	38	38	—	—	—
Castration	8	7	—	—	1
Minor operations, unclassified ..	59	55	3	1	—
Excision of tumours, malignant new growths	2	—	1	—	1
Excision of tumours, non-malignant new growth	21	21	—	—	—
Excision of cyst (sebaceous) ..	7	7	—	—	—
,, ,, (unclassified) ..	27	26	1	—	—
Incision and drainage (abscess) ..	156	130	20	2	4
Removal of foreign bodies	13	12	—	1	—

LIST OF OPERATIONS.—*Continued.*

Operations	Number of cases	Results			
		Completely successful	Partially successful	Failed	Died
Operations on arteries	1	1	—	—	—
,, for aneurysm	2	1	—	—	1
,, on veins	91	91	—	—	—
,, for hæmorrhage	2	2	—	—	—
Neurorrhaphy	2	2	—	—	—
Cautery of nerve	1	—	1	—	—
Stretching of nerve	1	1	—	—	—
Dissection	1	1	—	—	—
Excision of cicatrix	4	4	—	—	—
Scraping, &c.	9	5	4	–	—
Evulsion of nail	34	34	—	—	—
Excision of corn	1	1	—	—	—
Breaking down of adhesions.. ..	1	1	—	—	—
Skin grafting	2	2	—	—	—
Excision of glands	58	58	—	—	—
Erasion of glands	13	13	—	—	—
Incision and drainage of glands ..	2	2	—	—	—
Incision of periosteum	2	2	—	—	—
Excision	7	7	—	—	—
Removal of fragments of bone or sequestra	18	15	3	—	—
Removal of carious bone	1	1	—	—	—
Removal of exostosis	3	3	—	—	—
Trephining (osteo-myelitis)	1	1	—	—	—
Un-united or ill-united fracture ..	31	22	3	6	—
Fractured bones..	7	7	—	—	—
Reduction of dislocation	15	9	6	—	—
Operation for ankylosis	15	9	2	4	—
Aspiration (synovitis)..	1	1	—	—	—
Incision with or without drainage ..	3	1	—	2	—
Excision, partial or complete ..	13	10	3	—	—
Arthrectomy	3	2	1	—	—
Erasion..	3	2	1	—	—
Removal of loose bodies (cartilage)..	23	20	2	1	—
Fixing loose cartilage	1	1	—	—	—
Excision of articular cartilage ..	10	10	—	—	—
Tenotomy	5	4	1	—	—
Union of divided tendon	8	8	—	—	—
Division of fasciæ	1	—	1	—	—
,, adhesions	2	—	—	2	—
Incision and drainage	1	1	—	—	—
Amputation—forearm	1	1	—	—	—
,, right arm	1	1	—	—	—
,, fingers	17	17	—	—	—
,, foot	1	1	—	—	—
,, toes	44	43	1	—	—
,, unclassified	7	6	—	—	1
Trephining—depressed bone ..	8	4	1	1	2
,, intra-cranial hæmorrhage	1	—	—	—	1
Trephining—intra-cranial suppuration	2	—	—	—	2
Trephining—unclassified	3	2	—	—	1
Incision and scraping skull	2	—	2	—	—
Exploratory incisions	1	1	—	—	—
Trephining mastoid cells	2	1	1	—	—

LIST OF OPERATIONS.—*Continued.*

Operations	Number of cases	Results			
		Completely successful	Partially successful	Failed	Died
Scraping mastoid cells	1	1	—	—	—
Mastoid operation	5	5	—	—	—
Plugging of nares	1	1	—	—	—
Removal of polypus	1	1	—	—	—
Partial removal of tongue	2	1	—	—	1
Removal of tonsils	6	5	1	—	—
Nose broken and reset	1	1	—	—	—
Opening up of nose	1	1	—	—	—
Excision of large spur from nasal floor and septum	1	1	—	—	—
For ectropion	1	1	—	—	—
For strabismus	1	1	—	—	—
Iridectomy	4	2	—	2	—
Excision of eyeball	4	4	—	—	—
Removal of polypus (ear)	1	—	1	—	—
,, necrosis (ear)	1	—	—	—	1
Opening of mastoid antrum	3	3	—	—	—
Tracheotomy	3	2	—	—	1
Suturing (wound of neck)	1	1	—	—	—
Excision of breast (male)	1	1	—	—	—
Paracentesis of pleural cavity	4	3	1	—	—
Incision and drainage	18	14	2	—	2

TABLE SHOWING NATURE OF ANÆSTHETIC USED.

Anæsthetic	Number of cases
Chloroform	947
Ether	371
Chloroform and ether	89
Ethyl chloride	47
Ethyl chloride and ether	6
A.C.E. mixture	76
Nitrous oxide	55
Nitrous oxide and ether	33
Local (including cocaine, eucaine, &c.)	71

ROYAL ARMY MEDICAL COLLEGE.

EXAMINATION OF LIEUTENANTS OF THE ROYAL ARMY MEDICAL CORPS AND THE INDIAN MEDICAL SERVICE, AT THE CLOSE OF THE 1ST SESSION, 1906.

THE following copies of Examination Papers are published for information :—

Practical Hygiene.—March 23, 1906, from 10 a.m. to 1 p.m.

(1) The following analyses have been given by water samples. Give an opinion as to their fitness for drinking and domestic purposes. (See table, p. 107.)

(2) Estimate the fixed and removable hardness in the water sample, making the eturn as parts per 100,000 and grains per gallon of CaO. Estimate the oxygen absorbed by Tidy's process in 15 minutes. The strengths of the standard solutions are given on the blackboard.

(3) The milk sample is suspected to contain formaldehyde. Ascertain if such is e case.

Hygiene.—(Written.) March 29, 1906. From 10 a.m. to 1 p.m.

(1) Construct a simple dietary that in your opinion would be sufficient for a man of average weight, engaged in ordinary work, and state on what principles you base your recommendations.

	A	B
	Parts per 100,000	Parts per 100,000
Source	Shallow well in the garden of a private house	Deep well in the chalk.
Total solids	24	55
Total hardness	15	35
Fixed hardness	5	14
Chlorine	2·6	3·5
Free ammonia	0·004	0·001
Albuminoid ammonia	0·013	0·004
Nitrous nitrogen	Nil	Nil
Nitric nitrogen	0·5	0·6
Oxygen absorbed at 80° F. in 15 minutes	0·1	0·02
Total bacterial count	900	90
	Organisms isolated, which liquefied gelatine, formed acid and gas in glucose and sucrose peptone, clotted milk, and formed indol.	Organisms grew in the bile salt medium, but the reaction remained unchanged.

(2) State concisely the points in regard to water supply and drainage arrangements to which you would direct your attention in making a sanitary inspection of barracks.

(3) You are placed in medical charge of a small body of troops in camp, the only available water supply for which is from a polluted source. Pasteur filters have been provided, for the proper working of which you are responsible. Describe fully what measures you would take to ensure the troops being supplied with pure water.

(4) Describe briefly what you regard as the most important points to be attended to, in order to preserve your health in a tropical or sub-tropical climate, in relation to (*a*) your diet; (*b*) your clothing; and (*c*) your general habits.

(5) What are the modes of spread of Asiatic cholera? Describe briefly what preventive measures you would adopt on the outbreak of the disease in the body of troops of which you are in medical charge.

(6) What is the significance of the presence of an organism of the *Bacillus coli* group in a drinking water? What method would you adopt to isolate the organism, and by what means would you identify it as being the *B. coli communis* of Escherich?

Note.—Only five questions are to be answered, of which No. 6 must be one.

Practical Pathology.—Friday, March 30, 1906. From 10 a.m. to 1 p.m.

(1) Examine the bacterial culture with which you are provided, and write a short account of the results of your examination, recording your opinion (i.) as to the possible nature of the germ; (ii.) as to whether the culture is "pure" or "contaminated."

Leave your stained specimens, properly labelled, beside your microscope.

(2) Stain the (unfixed) film provided by Gram's method, and examine it with a view to determining (i.) the nature of the film; and (ii.) the presence or absence of Gram-staining micro-organisms. Record your results in your paper, and label your specimen as directed.

(3) Stain a film of your own blood, by whatever method you prefer, and leave it on the stage of your microscope with a large mononuclear leucocyte in focus under the oil-immersion lens.

(4) Oral examination as to specimens displayed under the microscope.

Pathology.—(Written.) Wednesday, March 28, 1906. From 10 a.m. to 1 p.m.

(1) Describe the various cells found in the red bone-marrow, mentioning, in the case of each, whether such cell is ever to be found in the peripheral blood, and, if so, the significance you would attach to its presence in this situation.

(2) In the investigation of a bacterial disease, what are the various possibilities to be taken into consideration as regards (*a*) the channel of infection; (*b*) the mode of elimination from the body? Illustrate your remarks from your knowledge of the causation of the principal bacterial diseases of man.

(3) How would you diagnose a case of diphtheria by bacteriological methods, and in what manner would you differentiate the *Bacillus diphtheriæ* from Hoffman's bacillus?

(4) Describe the *Spirochæta pallida*, and discuss the evidence as to its causative *rôle* in syphilis.

Military Surgery.—Thursday, March 29, 1906. From 2.30 to 5.30 p.m.

(1) Describe the "explosive" type of exit wound; state under what circumstances it is met with, and explain how it is produced (10 marks).

(2) Describe the injuries to large nerves caused by the modern rifle bullet, and discuss briefly their diagnosis and treatment (30 marks).

(3) Describe the effects of the modern rifle bullet upon the shafts of long bones. Give the principal points in the treatment of gunshot fractures (30 marks).

(4) How do you account for the absence of symptoms of visceral lesion in certain cases of penetrating gunshot wound of the abdomen? Under what circumstances would you perform laparotomy for gunshot wound of the abdomen (30 marks).

Tropical Medicine.—(Optional for Lieutenants, Royal Army Medical Corps.) Wednesday, March 28, 1906. From 2.30 p.m. till 5.30 p.m.

(1) (*a*) Name, in order of frequency, those of the diseases of hot climates which cause the largest number of admissions to hospital, and state after each in what foreign stations it is most prevalent.
(*b*) What special features are associated with the incidence of enteric fever in the British Army as compared with those affecting its prevalence in the civil population of Great Britain, leaving aside all questions of sanitation?

(2) (*a*) What are the general clinical characters of a malignant malarial infection?
(*b*) What are the most important varieties of malignant malarial fever?
(*c*) Discuss the treatment of a benign tertian infection.

(3) Give an account of the causation, symptoms and diagnosis of hepatic abscess.

(4) (*a*) Describe the clinical features and course of a case of sprue.
(*b*) With what other disease has it been confounded, and state the grounds for the differentiation between these two diseases.

(5) Give an account of the etiology, clinical features, and prophylaxis of Ankylostomiasis.

[N.B.—Either the 4th or 5th question to be answered, but not both.]

Military Medical Administration.—(Optional for Lieutenants, Royal Army Medical Corps.) Friday, March 30, 1906. From 2.30 p.m. to 5.30 p.m.

(1) Of what do the land forces consist, and how are they governed? What are the Reserves?

(2) What do the Army Medical Services consist of, and what are the powers of command of medical officers?

(3) How are medical officers distributed in a field army, and what are the medical field units therein?

(4) Give an account of the duties of a medical officer in charge of troops in barracks.

(5) How is invaliding of soldiers done at home, and for what is the medical officer in charge of the case responsible?

EXAMINATIONS.

The following results of examinations are notified for general information:—

Passed in (*h*) *i* for the rank of Captain: Lieutenants T. E. Harty, R. H. Bridges, H. B. Kelly, M.B., W. Wiley, M.B., D. P. Johnstone, F. M. M. Ommaney, J. C. G. Carmichael, M.B., H. C. Hildreth.

ROYAL ARMY MEDICAL CORPS ANNUAL DINNER.

The Annnal Dinner of the Corps will take place on Monday, June 18, at the "Empire Hall," Trocadero Restaurant, Piccadilly Circus, W., at 8 o'clock, precisely; the Director-General in the chair. Members intending to dine are requested to inform the Hon. Secretary as soon as possible, in order that the probable number attending may be known and that tickets may be sent.

All subscribers to the R.A.M.C. Fund, except any who may have expressly excluded the Annual Dinner in the allocation of their subscriptions, will be entitled to dine at subscribers' rates, provided that their subscriptions are credited to the R.A.M.C. Fund before the date of the dinner; also all officers who do not subscribe to the R.A.M.C. Fund but who still subscribe to the former R.A.M.C. Dinner Fund.

The price of the Dinner to subscribers will be 10s. The amount should be paid personally at the Hotel on the evening of the dinner.

The price to non-subscribers will be £1 12s. 6d., which must be sent by cheque or Post Office Order to the Hon. Secretary when applying for tickets. If the officer is unable to dine the money will be returned.

H. C. THURSTON, *Major, R.A.M.C.*,
Hon. Sec., Sub-Committee, R.A.M.C. Dinner Fund.

66, *Scarsdale Villas, Kensington, W.*

RESULT OF THE EXAMINATION FOR THE DIPLOMA OF TROPICAL MEDICINE, UNIVERSITY OF LIVERPOOL, HELD ON MARCH 26, 27 AND 28, 1906.

Examiners.—External Examiner, Colonel D. Bruce, C.B., F.R.S., R.A.M.C. Internal Examiners, Professor R. Ross, C.B., F.R.S., D.Sc., F.R.C.S., J. W. W. Stephens, M.D.; C. J. Macalister, M.D., C.M.; R. Newstead, A.L.S., F.E.S. (Examiner in Medical Entomology).

The following candidates have been recommended for the Diploma in Tropical Medicine: F. A. Arnold, M.B., D.P.H., J. B. Bate, L.S.A., J. Dundas, M.B., Major N. Faichnie, R.A.M.C., M.B., D. F. Mackenzie, M.B., Major A. Pearse, R.A.M.C., D.P.H., Captain R. D. Willcocks, I.M.S., M.B.

ASSOCIATION OF MILITARY SURGEONS, U.S.A.

IN the competition for the Seaman Prize for 1905, Major F. Smith, D.S.O., of the Corps, was awarded second prize (Life Membership of the Association, valued at 55 dollars) for a paper on "The Prevention of Disease in the United States Army."

The first prize (500 dollars) was won by Major Jefferson R. Kean, of the American Army Medical Department. Papers were limited to 12,000 words.

THE ROYAL ARMY MEDICAL CORPS FUND.

THE TWENTY-THIRD MEETING OF THE COMMITTEE.

THE Twenty-third Meeting of the Committee was held at 68, Victoria Street, S.W., on Friday, April 6, 1906, at 3.30 p.m.

Present.

Surgeon-General A. Keogh, C.B., Director-General, A.M.S
Surgeon-General Sir Charles McD. Cuffe, K.C.B.
Lieutenant-Colonel E. M. Wilson, C.B., C.M.G., D.S.O.
Lieutenant-Colonel A. B. Cottell.
Lieutenant-Colonel Sir James Clark, Bart., C.B.
Surgeon-General W. J. Fawcett, C.B.
Colonel A. T. Sloggett, C.M.G.
Colonel H. E. R. James.
Major H. C. Thurston, C.M.G.
Captain H. R. Bateman.
Captain and Quartermaster A. Bruce.

Minutes.—(1) The Minutes of the Twenty-second Meeting were confirmed.

(2) Captain H. R. Bateman having been appointed in accordance with Minute 8 of the Twenty-second Meeting, took his seat upon the Committee.

(3) It was noted that Lieutenant-Colonel Firth, having completed his appointment as Professor of Hygiene, ceased to be a member of the Committee.

(4) In order that the Committee might have the power to select as members officers of ranks not represented on the Committee, the following amendment was made to Minute 2 of the Third Meeting :—

Instead of "Professor of Hygiene, Medical Staff College," read "One of the Professors at the Royal Army Medical College."

(5) Major C. G. Spencer, Professor of Surgery at the Royal Army Medical College, was unanimously elected a member of the Committee, *vice* Lieutenant-Colonel Firth.

(6) *Memorials.*—The Sub-Committee (Surgeon-General Sir Charles McD. Cuffe, K.C.B., Colonel A. T. Sloggett, C.M.G., and Colonel H. E. R. James) appointed in Minute 5 of the last Meeting, presented a Report, on the subject of Memorials, which, after full discussion, was approved as follows:—

(*i.*) In the Officers' Mess, Royal Army Medical Corps, Netley, there are portraits of the following Director-Generals: Sir James McGrigor, Bart., Sir William Mure Muir, K.C.B., Sir Galbraith Logan, K.C.B., Sir Andrew Smith, K.C.B., and there is a bust of Inspector-General T. Alexander, C.B.

There is an oil-painting of Surgeon-General J. Jameson in the Aldershot Mess.

There are no portraits available of the following Director-Generals: Surgeon-General J. B. Gibson, C.B., Sir Thomas Crawford, K.C.B., Sir William Taylor, K.C.B., Surgeon-General A. Keogh, C.B.

It was resolved, therefore, that portraits of these four Director-Generals should be obtained, and for this purpose the Sub-Committee was authorised to expend a sum not exceeding £500.

(*ii.*) It was resolved that a picture, commemorative of Surgeon J. A. Landon at Majuba, should be painted on the same lines as those already acquired for the V.C. Gallery, for which purpose a sum of £15 15s. was voted.

(*iii.*) The question of statues of John Hunter and William Harvey, and busts of Richard Wiseman, G. J. Guthrie, and Robert Jackson, was postponed for future consideration.

(*iv.*) It was resolved that a scroll setting forth the names and records of distinguished officers should be arranged for as soon as the College was completed, and that the names of Surgeon T. R. Lewis and Deputy Inspector-General Henry Marshall should be inscribed thereon.

(*v.*) The above-named Sub-Committee was appointed an Executive Sub-Committee to carry out the above proposals, and was requested to make such further recommendations as might become desirable.

(7) It was resolved that a window in the Royal Army Medical College should be allocated to commemorate the Commandants of the College, the commemoration to take the form of the coat of arms of each Commandant and a record of the years during which he held the appointment.

(8) *The Band.*—On behalf of the Sub-Committee appointed in Minute 4 of the last meeting, Colonel James stated that he was not able as yet to present a report on the subject of the Band. He made a statement setting forth the results of certain enquiries he had made.

The Committee asked the Band Sub-Committee to prepare a statement for publication in the next issue of the Journal setting forth the position of affairs as regards the Band and any recommendations considered advisable for discussion at the General Meeting.

It was resolved to recommend to the consideration of the General Meeting that a sliding scale of subscriptions to the Band should be adopted to meet any increase in expenditure which may be required.

(9) *Compassionate and Band Funds.*—A Report of a quarterly meeting of the Aldershot Sub-Committee held at Aldershot on the 2nd instant was approved.

(*a*) The quarterly accounts to March 31 last of the Widows' and Orphans' Fund were approved and are appended to these Minutes, together with a detailed statement of cases receiving relief.

The sum of £40 was voted to meet grants required during the current quarter.

It was observed that the funds allocated to Widows and Orphans, deposited with Messrs. Holt and Co., will now be drawn upon, and that in about a year's time this special fund will be exhausted, and provision for Widows and Orphans will be made from the General Relief Fund, thus simplifying the accounts of the Royal Army Medical Corps Fund.

(*b*) The quarterly accounts of the General Relief Branch to March 31 last were approved and are appended to these Minutes, as well as a detailed statement of cases receiving relief.

A sum of £35 was voted from the General Relief Fund for the expenses of the current quarter.

(*c*) The quarterly accounts of the Band Fund to March 31 last were approved and are appended to these Minutes.

A sum of £70 was granted from the Royal Army Medical Corps Fund for the current quarter's expenses, which include the purchase of a new "B flat" Euphonium at a cost of £15.

(10) *Annual Dinner.*—The Committee adopted a Report of the Royal Army Medical Corps Annual Dinner Sub-Committee as follows:—

(*i.*) Lieutenant-Colonels Beattie and Hector having both resigned their seats on this Sub-Committee, it was noted that Lieutenant-Colonel Wilson was elected on February 17, 1905, to fill the former vacancy, and the Committee now elected Lieutenant-Colonel Sir James Clark to fill the latter vacancy.

(*ii.*) It has been arranged that the next Annual Dinner shall be held at the Trocadero Restaurant in the Empire Hall and Alexandra Rooms.

(*iii.*) It was resolved that, owing to reduction in the terms under the new contract for the dinner, the cost of tickets to subscribers should be 10s., and to non-subscribers £1 12s. 6d.

(*iv.*) The number of subscribers during 1905 to the old Dinner Fund of the Royal Army Medical Corps was fifty-seven.

(*v.*) The accounts for last year in connection with the Annual Dinner are appended to these Minutes.

(11) *Benevolent Fund.*—The Royal Army Medical Corps Fund having a direct interest in the Army Medical Officers' Benevolent Fund, the Director-General pointed out to the Committee that the operations of the latter Fund are limited by the smallness of the sums at the disposal of the Committee. Officers desirous of supporting the Fund should send their subscriptions to Colonel T. Ligertwood, C.B., 16, St. Leonard's Terrace, Chelsea, S.W. The annual subscription is £1 1s.

The Committee agreed that it was desirable to use every means of impressing the usefulness of the Benevolent Fund on officers and of appealing to them for their support.

(12) The sum of 6s. has been received for the General Relief Fund from the Manager of the Journal on account of a double subscription paid by members of the Detachment, Royal Army Medical Corps in Canada. As these members were no longer in his command, Major Wright, R.A.M.C., had been unable to refund the amount, and therefore transmitted it to the Manager to hand over to the Compassionate Fund (General Relief).

(13) The following sums have been received for the General Relief Fund:—

	£	s.	d.
Subscription to December 31, 1905, from the Regimental Institute, Netley	£25	0	0
Colonel M. D. O'Connell on behalf of some Officers, R.A.M.C., in the Northern Command	0	14	6
Detachment, R.A.M.C., Cottonera, Malta	2	10	0

(14) The sum of £23 has been paid for the Wolseley Memorial Brass which has been completed and placed in the Library of the Cambridge Hospital, Aldershot.

(15) Three V.C. pictures have been framed at a cost of £1 9s. 9d.

(16) The following auditors for the half-yearly accounts to the May 31, 1906, were appointed: Surgeon-General Sir Charles McD. Cuffe, K.C.B., Colonel H. E. R. James.

(17) Lieutenant-Colonel Wilson pointed out the useful work carried out by the Incorporated Soldiers' and Sailors' Help Society in dealing with cases of distress among members of the Royal Army Medical Corps and their families, and asked the Committee to consider the advisability of making an annual donation to the Society.

It was therefore resolved to make an annual donation of £5 5s. to the above Society.

B. Skinner, *Lieutenant-Colonel,*
Hon. Secretary.

April 9, 1906.

THE ROYAL ARMY MEDICAL CORPS DINNER FUND.

STATEMENT OF ACCOUNTS FOR YEAR ENDED DECEMBER 31, 1905.

RECEIPTS.

1905.		£	s.	d.
	To Balance, Cash in hand	4	0	3
	,, Receipts by Bank (Old Subscribers) ..	19	12	6
June 19	,, Cash taken at Doors (Dinner)	105	10	0
,, ,,	,, Receipts from R.A.M.C. Fund	180	18	0
July 12	,, ,, ,, ,, ,, for Band (Travelling Expenses)	5	0	0
,, ,,	From R.A.M.C. Fund (Paid to Secretary, Dinner Sub-Committee, for Postal and other Expenses)	6	5	8½
		£321	6	5½

EXPENDITURE.

1905.		£	s.	d.
	By Refund to Colonel Ligertwood and Major Jameson	2	0	0
Jan. 11	,, Cheque Book	0	4	2
June 10	,, Cheque, Messrs. May and Williams (1904)	3	14	6
,, 13	,, Refund to Major J. D. Moir	0	5	0
,, 16	,, Cigarettes (Berklowitch)	0	15	0
,, 18	,, Tobacco (A. and N. Stores)	11	18	7
,, 23	,, Cheque, Aldershot Mess (Expenses for Plate)	2	4	2
,, ,,	,, Cash, Hotel Metropole	105	10	0
,, ,,	,, Cheque, Hotel Metropole (R.A.M.C. Fund)	180	18	0
,, ,,	,, Stationery (A. and N. Stores)	1	14	7
July 3	,, Cheque, R.A.M. College	1	0	0
,,	,, Messrs. May and Williams (1905) ..	4	4	6
July 12	,, Postage and Clerical Labour	1	17	11½
,,	,, Travelling Expenses (Band)	5	0	0
		£321	6	5½

ROYAL ARMY MEDICAL CORPS BAND FUND.

BALANCE SHEET FOR QUARTER ENDED MARCH 31, 1906.

RECEIPTS.

			£	s.	d.
Jan.	1	Balance	8	18	9
,,	3	Five Subscriptions through Holt and Co. ..	1	5	0
,,	11	President, R.A.M.C. Mess (Dec.)	8	15	0
,,	17	Hon. Secretary, R.A.M.C. Fund	72	0	0
Feb.	12	President, R.A.M.C. Mess (Jan.)	9	0	0
Mar.	12	President, R.A.M.C. Mess (Feb.)	5	2	6
			£105	1	3

EXPENDITURE.

						£	s.	d.
Jan.	30	Pay of Bandmaster	£10	0	0			
,,	,,	,, Band	13	3	6			
						23	3	6
Feb.	27	Pay of Bandmaster and Band				21	16	0
Mar.	13	Mr. Bennett—Expenses to College[1]				2	8	9
,,	26	Hawkes and Son, Instruments, Repairs, &c...				25	13	2
,,	,,	Boosey and Co., Music				5	0	0
,,	,,	Pay of Bandmaster and Band				22	18	3
,,	,,	Gale and Polden				0	10	0
,,	27	Mr. Bennett—Expenses to College[1]				2	8	9
,,	31	Balance				1	2	10
						£105	1	3

Aldershot,
March 31, 1906.

(*Signed*) G. ST. C. THOM, *Major*,
Hon. Secretary.

[1] Outstanding.

ROYAL ARMY MEDICAL CORPS COMPASSIONATE (WIDOWS' AND ORPHANS') FUND.

Balance Sheet for the Quarter ended March 31, 1906.

Receipts.

Date.	From whom received.	On what account.	£	s.	d.
1906.					
Jan. 1	Balance Credit last Quarter	At Bank ..	14	4	11
		On Deposit and Interest[1] ..	131	3	9
			£145	8	8

Expenditure.

Date.	To whom paid.	On what account.	£	s.	d.
1906.					
Jan. 1 to Mar. 31	Various	Monthly Disbursements to 19 Widows and 1 Orphan	75	0	0
Feb. 17	Mrs. W... ..	Grant	2	10	0
Mar. 28	Mr. S.	Stationery	0	2	6
Mar. 31	Sgt. H. Cassell..	Clerk	0	10	0
		Postage	0	5	8
		Cheque Book	0	10	0
		alance at Bank ..	66	10	6
			£145	8	8

Aldershot,
March 20, 1906.

Audited and found correct,
(*Signed*) T. J. R. LUCAS,
Lieutenant-Colonel.

(*Signed*) G. ST. C. THOM, *Major*,
Hon. Secretary.

[1] Transferred to General Account during the quarter.

ROYAL ARMY MEDICAL CORPS COMPASSIONATE FUND—GENERAL RELIEF.

BALANCE SHEET FOR THE QUARTER ENDED MARCH 31, 1906.

RECEIPTS.

Date. 1906.	From whom received.	£	s.	d.
Jan. 1	Balance Credit last Quarter	8	1	4
,, 17	Secretary, R.A.M.C. Fund Grant	35	0	0
		£43	1	4

EXPENDITURE.

Date. 1906.	To whom paid.	On what Account.	£	s.	d.
Jan. 1 to Mar. 31	Various	Disbursements to 9 Cases receiving Monthly Relief..	25	10	0
Jan. 4	Major H. C. Thurston	For Urgent Cases..	5	0	0
Feb. 1	Mrs. S.	Grant	3	0	0
,, 7	Mr. R.	,, ...	2	0	0
,, 15	Mr. S.	,, ...	1	10	0
,, 22	Bank	Cheque Book ..	0	5	0
Mar. 31	Sergeant H. Cassell..	Clerk	0	10	0
		Postage	0	3	3
		Balance at Bank	5	3	1
			£43	1	4

Aldershot,
March 29, 1906.

Audited and found correct,
(*Signed*) T. J. R. LUCAS,
Lieutenant-Colonel.

(*Signed*) G. ST. C. THOM, *Major*,
Hon. Secretary.

ROYAL ARMY MEDICAL CORPS COMPASSIONATE FUND—GENERAL RELIEF.

STATEMENT OF RECEIPTS AND DISBURSEMENTS MADE BY MAJOR H. C. THURSTON, C.M.G., AT HEADQUARTERS, ON BEHALF OF THE ABOVE CORPS FUND, IN RELIEF OF URGENT CASES OF DISTRESS, &c.

RECEIPTS.

1905.			£	s.	d.
Dec.	5	To Balance—Cash in hand	2	13	5
,,	6	From Hon. Secretary	5	0	0
			£7	13	5

EXPENDITURE.

1906.			£	s.	d.
Jan.	13	By help given to S. B., discharged R.A.M.C., after twelve years' colour service. Gets attacks of ague. Out of work	1	0	0
Feb.	3	By help given to M. J. O'D. Out of work. To prevent home being sold up	1	0	0
,,	6	By help given to S. B. to obtain food and shelter	0	2	6
Mar.	5	By help given to H. S. to assist him whilst looking for employment	0	10	0
,,	16	By help given to Mrs. J. in anticipation of weekly grant from R.A.M.C. Funds (Private J., ex-R.A.M.C. being seriously ill [intestinal obstruction])	0	10	3
,,	31	Balance—Cash in hand	4	10	8
			£7	13	5

Headquarters,
April 4, 1906.

(*Signed*) H. C. THURSTON, *D.A.D.G.*

ROYAL ARMY MEDICAL CORPS COMPASSIONATE FUND.

The following have received relief during the Quarter ended March 31, 1906:—

Widows' and Orphans' Fund.

Name of recipient	Age	Number of children	If in receipt of a pension. Amount	Monthly grant from Fund	Total amount received from Fund	Remarks
Child P., Cahir	8	..	None	£1 5s.	£38 2s.	Child of the late 7150 Staff-Sergeant, who died at Sierra Leone. Guardian does not wish the child, who is not strong, to be placed in a school.
Mrs. S., London	37	3	None	£2	£78	Widow of a Private, and has heart disease. Children are all young.
Mrs. C., Norwich	40	2	None	£2	£67	Widow of a Private, and suffers from rheumatism. One child is in the Duke of York's School, and a girl, aged 10, at home, is delicate.
Mrs. R., Dublin	46	3	None	£2	£58	Widow of 2512 A. H. Corps; is in delicate health. Two eldest children have signs of tubercular disease.
Mrs. S., Dublin	62	..	None	£1 10s.	£61	Widow of a Corporal; decrepit and nearly blind.
Mrs. E., Dublin	43	3	None	£1	£48	Widow of a Staff-Sergeant; is in weak health. Youngest child 15 years and another delicate.
Mrs. I., Dublin	63	1	None	£1 10s.	£43 10s.	Widow of a pensioner; daughter unable to help her.
Mrs. K., London	68	..	None	£1 10s.	£39	Widow of a pensioner; is too old to work.
Mrs. S., London	59	..	None	£1 10s.	£48	Widow of a pensioner; cannot work owing to ill-health.
Mrs. H., Chester	46	4	None	12s. 6d.	£47 10s.	Widow of 15532 Corporal. Of children, one is partially a cripple, two are in schools, and the eldest helps a little.
Mrs. C., Chester	36	1	None	12s. 6d.	£42 10s.	Widow of 9938 Private; suffers from heart trouble. Does not wish the child, aged 6, placed in a school.
Mrs. G., Dublin	50	4	None	£1 10s.	£24	Widow of 2737 Private; youngest child 12 years of age. In receipt of variable sums from two sons, sometimes nothing.
Mrs. M., Dover	44	5	None	£1	£24	Widow of a Srgt.-Major. Four of the children are in homes; one, aged 8, is with her.

WIDOWS' AND ORPHANS' FUND.—*Continued.*

Name of recipient	Age	Number of children	If in receipt of a pension. Amount	Monthly grant from Fund	Total amount received from Fund	Remarks
Mrs. B., Sevenoaks	39	..	None	£1	£8	Widow of a Sergeant-Major. Grant made until employment is obtained. Receives 3s. 6d. a week locally.
Mrs. G., London	39	5 and another expected	None	£1 10s.	£9	Widow of a Corporal. Two of the children are assisting her. Cannot work owing to her condition. Two eldest children 18 and 16. Remainder under 8. Grant made as a temporary measure.
Mrs. M., Aldershot	52	4	None	£1	£7	Widow of a Sergeant-Major. Has three sons serving in the Corps (two sergeants, one private) who help her. She is unable to support herself. Children are all grown up.
Mrs. H., Dublin	59	2	None	£1 10s.	£11 10s.	Widow of 1721 Private. Children both grown up and unable to assist her. Is unable to work. Grant reduced from £2 from March 1, 1906.
Mrs. B., London	79	2	None	£1	£2	Widow of No. 8 late Sergeant-Major. Is too old to work. The two sons contribute 3s. weekly between them and cannot give more.
Mrs. W., Streatham	29	2	None	..	£2 10s.	Widow of 8515 Private. Was granted £2 10s. to assist her in clearing off debts after her husband's death.
Mrs. V., Netley	29	3	None	£1 10s.	£7 10s.	Widow of 10407 Sergeant, who died at Malta. Children are all young and require looking after by the mother. The eldest is registered for a school.
Mrs. S., Netley	57	2	None	£1	£38	Widow of a pensioner. Youngest child 17 years of age and earn 12s. 6d. a week between them. Grant made for six months.

GENERAL RELIEF FUND.

Name of recipient	Age	Number of children	If in receipt of a pension. Amount	Monthly grant from Fund	Total amount received from Fund	Remarks
Mr. S., Farnboro	38	1 (wife expects another)	None	..	£2 10s.	Late Private. Was given £1 10s. to assist him while out of employment.
Mrs. H., London	35	1	None	£1 10s.	£22 10s.	Wife of a discharged Corporal (10552), who has deserted her.
Mr. L., Havant	36	1	None	£1	£73	Late 10001 Private. Suffers from tubercle of lung. Can only do light work.
Mr. N., London	46	4	None	£2	£9	Late 5270. A widower. Children are being cared for by relatives. Has only one eye, the vision of which is very defective. He is unable to work.
Mr. R., Woolwich	70	1	1s. 6d. a day	£1	£3	Late 445 A.H.C. Too old to work, and lives with married daughter who is poor.
Mrs. S., Netley..	23	..	None	..	£3	Wife of 19047 Private, in prison for theft. Granted £3 to assist her during confinement.
Mr. R., London	52	4	None	..	£8	Late 5102. Was granted £2 to assist in the maintenance of his wife, he having been sent to a convalescent home.
Mr. O'D., Rochester	46	7	1s. 8d. a day	£1 10s.	£3	Late 16014 Corporal. Children all under 13 except one girl, aged 16. Grant made to assist him until he obtains employment. Will be reduced to £1 a month from April 1, 1906.
Mr. A., Netley..	50	4	1s. 6d. a day	£1	£3	Late 2938 Corporal. Has Bright's disease and unable to work. Wife is delicate. Grant made for six months.
Mr. T., Dublin..	50	1	None	£1	£2	Late 2811 Private. Married and child, aged 22. Has signs of incipient phthisis and unable to work. Wife earns about 4s. a week.
S.-Sjt. S., Woolwich	..	2	..	£1	10s.	Grant made to assist in defraying expenses of wife, who is in a home for consumptives in the Isle of Wight. Serving at No. 12 Company.
Mr. J., London..	..	2	None	6s. weekly	£1 10s.	Late 5656 Private. Grant made to assist him while ill with an intestinal obstruction. Receives further help from the Charity Organisation Society.

Aldershot,
April 2, 1906.

(*Signed*) G. ST. C. THOM, *Major*,
Hon. Secretary.

MARRIAGE.

WILSON—NUNGOVICH.—On December 20, 1905, at All Saints Church, Cairo, by the Very Rev. Dean Butcher, D.D., and Rev. H. Wilson, B.A., Captain Richard Chapman Wilson, R.A.M.C., son of R. J. Wilson, Esq., Dublin, to Marguerite, eldest daughter of George Nungovich Bey, of Cairo.

DEATHS.

McKINNON.—On April 5, at Reigate, Surgeon-General David Reid McKinnon, retired Medical Department, aged 84. He entered the Service December 12, 1843; was promoted Surgeon March 28, 1854; Surgeon-Major December 12, 1863; Deputy Inspector-General November 29, 1871; Deputy Surgeon-General March 1, 1873, and Surgeon-General January 11, 1879. He retired May 21, 1881. His war services were as follows: Crimean Campaign, 1854-5. Battles of Alma, Balaklava and Inkerman; siege and fall of Sevastopol, and expedition to Kimbourn. Medal with 4 clasps Knight, Legion of Honour; Fifth class Medjidie; and Turkish medal.

TULLOCH.—On April 8, at Eastbourne, Deputy Surgeon-General John Tulloch, M.D., retired Army Medical Staff, aged 76. He entered the Service June 7, 1854; was promoted Surgeon February 13, 1866; Surgeon-Major March 1, 1873; Brigade-Surgeon November 27, 1879, and Deputy Surgeon-General May 2, 1883. He retired on retired pay May 2, 1888. His war services were as follows; Indian Mutiny 1857-8. Capture of Atrowlea, advance to Lucknow, actions of Chanda, Umeerpore, Sultanpore and Douraha, siege and capture of Lucknow, storming of the Emam Bena and Kaiser Bagh, relief of Azimghur, operations in the Jugdespore jungles, and Shahabad. Medal with clasp.

EXCHANGES.

The charge for inserting Notices respecting Exchanges in the Royal Army Medical Corps, is 5/- for not more than five lines, which should be forwarded by Cheque or P.O.O., with the notice, to Messrs. G. STREET and CO., Ltd., 8, Serle Street, London, W.C., not later than the 22nd of the month.

Officer expecting to go to India early in 1907 desires exchange with a Lieutenant-Colonel, or Major, due for promotion. Apply "Nodor," c/o Sir C. McGrigor, 25, Charles Street, S.W.

NOTICE TO SUBSCRIBERS.

Officers are particularly requested to give timely notice of changes of station or changes of address, in order to ensure the posting of the Journal to its correct destination.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, &c. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts and commands at home and abroad. All these communications should be written upon one side of the paper only, they should by preference be typewritten, but, if not, all proper names should be written in capital letters (or printed) to avoid mistakes, and be addressed to The Editor, Journal of the Royal Army Medical Corps, 68, Victoria Street, London, S.W.

Letters regarding subscriptions, non-delivery of the Journal, or change of address, should be sent to The Manager, Journal of the Royal Army Medical Corps, 68, Victoria Street, London, S.W.

Communications have been received from Lieutenant-Colonels M. W. Russell, F. J. Lambkin, C. Birt, H. J. Barratt, G. Coutts; Brevet-Lieutenant-Colonel G. S. McD. Elliot, R.E.; Majors J. G. McNaught, D. J. Collins, R. F. E. Austin, W. Tibbits; Captains F. F. Carroll, W. S. Harrison, N. J. G. Rutherford, H. R. Bateman, W. A. Ward, E. D. W. Grieg, I.M.S.; Lieutenant W. C. Rivers (H.P.); C. A. Hill, B.Sc., F.I.C.

In the event of reprints of articles being required by the authors, notification of such must be sent when submitting the papers. Reprints may be obtained at the following rates, and other reprints at proportionate rates :—

Number of Reprints	Number of Pages	Cost			Extra for Covers							
					As Journal, Printed on Front		As Journal, Plain, Unprinted		Cheaper Paper, Printed on Front		Cheaper Paper, Plain, Unprinted	
		£	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
12	4	0	2	6								
	8	0	4	6	3	6	0	11	3	2	0	7
	16	0	7	6								
25	4	0	3	0								
	8	0	5	6	4	0	1	3	3	6	0	9
	16	0	9	6								
50	4	0	4	0								
	8	0	6	9	5	0	1	9	4	0	1	0
	16	0	12	0								
100	4	0	5	6								
	8	0	9	0	6	6	3	3	5	6	2	0
	16	0	16	9								
200	4	0	8	6								
	8	0	13	6	9	0	6	3	7	6	4	0
	16	1	3	6								

Cases for Binding Volumes.—Strong and useful cases for binding can be obtained from the publishers at the undermentioned rates:—

Covers, 1*s.* 4*d.* net; binding, 1*s.* 2*d.*
These charges are exclusive of cost of Postage.

In forwarding parts for binding the name and address of sender should be enclosed in parcel.

The following periodicals have been received: *The Medical Record, The Medical News, New York Medical Journal, American Medicine, Gazette Med. de Paris, Archives de Medicine et de Pharmacie Militaires, Il Morgagni, Gazetta Medico-Italiana, The Medical Review, El Siglo Medico, Der Militärärzt, Deutsche Militärärztliche Zeitschrift, Anales de Sanidad Militar, Revue Med. de la Suisse Romande, La Medicina Militar Espanola, The Boston Medical and Surgical Journal, Annali di Med. Navale, Giornale del Regio Esercito, Le Caducée, The Hospital, The Ophthalmoscope, St. Thomas's Hospital Gazette, Bulletin de l'Acad. de Med. de Paris, Arch. Med. Belges, Voyenno Medisinskii, The Indian Medical Gazette, The Australasian Medical Gazette, Journal of the Association of Military Surgeons, U.S., Militärlagen ungwet af Militärlaegeforeningen, i Kjobenharn, The Veterinary Journal, The Practitioner, Public Health, Medical Review, The Army and Navy Gazette, The United Service Gazette, Journal of the Royal United Service Institution, The Johns Hopkins Press, The Health Resort and Journal of Spas and Sanatoria, Journal of the Royal Sanitary Institute, Journal of the U.S. Institution of India, Indian Public Health, Bulletin de l'Institut Pasteur, Records of the School of Medicine, Cairo, The Philippine Journal of Science.*

We desire to remind members who have not paid their third year's subscription, which was due on July 1, 1905, that it is very important that such should be promptly paid.

NOTICE.

The Corps News is now printed as an inset to the Journal and separate copies may be subscribed for, price 2d. monthly.

JOURNAL

OF THE

ROYAL ARMY MEDICAL CORPS.

Corps News.

JUNE, 1906.

ARMY MEDICAL STAFF—GAZETTE NOTIFICATIONS.

Major Herbert J. M. Buist, D.S.O., M.B., Royal Army Medical Corps, to be a Deputy-Assistant Director-General, *vice* Major T. McCulloch, M.B., Royal Army Medical Corps, whose tenure of that appointment has expired, dated May 1, 1906.

ROYAL ARMY MEDICAL CORPS.

Lieutenant-Colonel Octavius Todd, M.B., to be Colonel, *vice* B. M. Blennerhassett, C.M.G., F.R.C.S.I., retired, dated April 4, 1906.

Lieutenant Percy Farrant, from the Seconded List, to be Lieutenant, dated April 1, 1906.

Lieutenant Augustus S. Williams, from the Seconded List, to be Lieutenant, dated April 1, 1906.

BREVET.

Lieutenant-Colonel Francis Joseph Lambkin, Royal Army Medical Corps, to be Colonel, under the provisions of Articles 36 and 356 of the Royal Warrant of March 19, 1906, dated May 9, 1906.

LIFE GUARDS.

1*st Life Guards.*—Captain Alfred Crichton Lupton, M.B., from the Royal Army Medical Corps, to be Surgeon-Captain, *vice* B. Pares, promoted, dated May 5, 1906.

ARRIVALS HOME.—From South Africa: Major H. J. M. Buist, D.S.O. From India: Major C. R. Elliott, Captains R. F. Ellery and C. R. L. Ronayne. From Jamaica: Captain E. G. Ffrench.

ARRIVALS HOME ON LEAVE.—From India: Lieutenant-Colonels H. J. Barratt, C. E. Faunce, M. W. Kerin, C. C. Reilly, A. S. Rose, Majors H. W. K. Read and F. A. Symons, Captains M. C. Beatty, T. Biggam, A. W. Hooper, D.S.O., F. S. Penny, Lieutenants H. B. Kelly, W. D. C. Kelly, R. J. Cahill and R. Rutherford. From Jamaica: Lieutenant-Colonel P. H. Johnston, C.M.G. From Bermuda: Major J. J. C. Watson, C.I.E. From South Africa: Lieutenant-Colonel N. C. Ferguson, C.M.G., and Lieutenant N. D'E. Harvey. From Egyptian Army: Major G. Dansey-Browning, Captain R. B. Black and Lieutenant G. F. Rugg.

EMBARKATIONS.—For West Africa: Lieutenant-Colonel C. R. Bartlett. For Egypt: Major J. C. Jameson; Lieutenants G. W. Heron, J. M. B. Rahilly and W. Byam.

POSTINGS.—Lieutenant-Colonel E. North and Major C. R. Elliott to Irish Command. Captain C. R. L. Ronayne to Northern Command. Captain R. F. Ellery to Southern Command. Captain E. G. Ffrench and Lieutenant F. M. M. Ommanney to Eastern Command.

TRANSFERS.—Major J. S. Davidson from Southern Command to Woolwich. Captain F. F. Carroll from Southern Command to Royal Arsenal, Woolwich.

EXCHANGES APPROVED.—Lieutenant-Colonels W. Babtie, V.C., C.M.G., and T. J. R. Lucas, C.B.

RETIRED PAY POST.—Major J. W. F. Long has been appointed to the Medical Charge of Dover Military Prison.

DIPLOMAS.—Captain H. B. Fawcus has obtained the D.P.H. Cambridge. Lieutenant-Colonel T. B. Winter and Captain F. Harvey obtained the D.P.H. London, in January, 1906.

NOTES.—Lieutenant-Colonel W. Babtie, V.C., C.M.G., has been appointed Administrative Medical Officer, Woolwich Area, and to charge of the Royal Herbert Hospital.

Major J. S. Davidson has been appointed Registrar and Secretary at the Royal Herbert Hospital in succession to Lieutenant-Colonel M. O'D. Braddell.

Major T. McCulloch is taken on the strength of London District while temporarily employed in Malta.

QUARTERMASTERS.

Quartermaster and Honorary Lieutenant A. Finley has been granted the honorary rank of Captain, dated May 6, 1906.

LIST OF CASUALTIES:—

Transfers from other Corps.—14008 Sergeant D. Watt, from Colonial Government, Northern Nigeria.

Transfers to other Corps.—6648 Quartermaster-Sergeant R. Hughes, to Hants Brigade Bearer Company, as Instructor; 7875 Staff-Sergeant C. Hunt, to Seaforth and Cameron Bearer Company, as Instructor: 6278 Staff-Sergeant T. Johnstone, to No. 4 Company R.A.M.C. Militia, as Instructor; 5671 Sergeant W. H. Servey, to No. 4 Company, R.A.M.C. Militia, as Instructor; 8587 Sergeant J. Connell, to Glasgow Companies, R.A.M.C. Militia, as Instructor; 9299 Lance-Sergeant A. Jackson, to Glasgow Companies, R.A.M.C. Militia, as Instructor; 8287 Sergeant W. E. Maitland, to Glasgow Companies, R.A.M.C. Volunteers, as Instructor; 8968 Sergeant C. R. W. Keefe, to Manchester Companies, R.A.M.C. Volunteers, as Instructor; 141 Private A. Duke to Royal Horse Artillery; 17019 Private J. Power, to Border Regiment; 18605 Private C. Hooton, to Royal Field Artillery.

Transfers to Army Reserve.—18572 Private C. J. Boyle, 18579 Private J. W. Wilson, 18594 Private H. W. Hastings, 16281 Private T. Ravenscroft, 11756 Private W. Pryor, 18664 Private J. Barrington, 18586 Private C. H. Bevan, 18663 Private G. Dowling, 18616 Private A. S. Jones, 18609 Private J. J. Ward, 18618 Private J. Brown, 18623 Private A. Nelson, 18596 Private E. O. McKeevor, 18583 Private T. Moore, 18598 Private A. Manning, 18599 Private H. J. Evason, 18646 Private R. Smith, 18642 Private H. J. France, 18687 Private S. C. Chandler, 18647 Private J. Rooney, 18669 Private A. Hammond, 18688 Private P. O'Donnell, 18676 Private J. Burr, 18680 Private T. Murphy, 18764 Private M. Kerwin, 18691 Private G. Mace, 18659 Private F. Lawford, 18672 Private C. J. Penney, 18660 Private T. W. Maller, 18694 Private A. W. Freeman, 18703 Private E. V. G. Hodgkins.

Deaths—14803 Private J. Gray, died at Bloemfontein, March 25, 1906; 14704 Private R. Bales, died at Wynberg, April 1, 1906; 7091 Private A. E. Gough, died at Portsmouth, May 3, 1906; 18465 Private A. Williams, died at Malta, April 29, 1906.

Discharges.—3664 Staff-Sergeant T. Jackson, termination of second period; 8066 Sergeant J. Carlisle, termination of second period; 15569 Corporal C. E. Powell, termination of engagement, A.O. 106; 19568 Private E. Thorpe, medically unfit; 171 Private J. Mullen, on payment, £10; 18936 Private F. Kidby, on payment, £25; 10100 Private F. G. Robinson, medically unfit; 7865 Private H. T. Martin, medically unfit; 14727 Private C. A. Piddington, termination of engagement, A.O. 106.

Departures for Abroad.—England to Malta, April 30: 18240 Lance-Corporal W. Johnstone; 11392 Private E. Conner, 18094 Private W. Burns, 17964 Private W. Bowler, 19432 Private W. T. Parker, 19102 Private H. C. Hughs, 18825 Private J. Monoghan, 18841 Private R. Clarke, 16993 Private J. Youngson, 17421 Private P. Plume, 13466 Private G. A. Holmes.

England to Sierra Leone, May 4: 12270 Sergeant J. Simmons, 12681 Private G. Plumb, 15383 Private W. Sawers.

Arrivals Home from Abroad.—From Halifax, Nova Scotia, to England, per s.s. "Parisian," April 12: 8001 Sergeant E. Halford.

From Jamaica to England, per s.s. "Port Antonio," April 11: 7756 Staff-Sergeant A. E. Harvey.

From Hong Kong to England, per s.s. "Achilles," May 1: 16497 Corporal W. H. Rann, 16503 Private A. McKinley.

From South Africa to England, per s.s. "Assaye," May 2: 12202 Sergeant T. Connolly, 16573 Sergeant R. S. Nichol, 14851 Sergeant C. B. Willsher, 10206 Sergeant J. Enwright, 9915 Sergeant J. Thullier, 12410 Sergeant R. B. Coombs, 10191 Lance-Sergeant J. R. Moore, 12100 Corporal A. E. Beams, 15018 Corporal A. J. Davies, 10436 Corporal F. Evans, 14716 Corporal J. McDwyer, 15312 Corporal G. Gillespie, 14620 Lance-Corporal S. Gowers, 15024 Private H. Alger, 14642 Private H. F. Atkinson, 14072 Private R. Benham, 15028 Private H. Calmels, 12632 Private J. T. Castello, 12131 Private J. Fish, 14481 Private B. Fleckney, 14215 Private G. Fraser, 14021 Private W. Greer, 15034 Private A. Lee, 12808 Private W. McCormack, 12763 Private H. McGowan, 14527 Private R. Mollison, 14611 Private P. E. Perryment, 14019 Private W. H. Tew, 14984 Private W. Truesdale, 17957 Private W. Butler, 15029 Private W. Edwards, 18267 Private J. O. Lyons, 15540 Private H. H. Lewis, 15736 Private C. J. Pearson, 15720 Private L. P. Thatcher.

Special Extensions of Service beyond Twenty-one Years.—7262 Sergeant-Major J. Hutton, 7310 Sergeant-Major F. W. Nowill, 6665 Sergeant-Major F. J. Bollen, 7288 Quartermaster-Sergeant W. J. Dudman, 7197 Staff-Sergeant F. Payne, 7253 Staff-Sergeant J. Forman.

EDUCATIONAL.

First Class Certificates Examination, March 27, 1906.—The following N.C.O.'s and men have been awarded first class certificates of education: 7345 Quartermaster-Sergeant W. Deans, 9709 Staff-Sergeant H. J. Muggleton, 9876 Staff-Sergeant A. G. Powell, 11049 Sergeant W. T. A. Ulph, 10711 Sergeant F. W. Sharpe, 10922 Sergeant H. Robinson, 11066 Sergeant H. B. Lee, 18324 Corporal D. Parker, 19148 Private A. Milthorpe, 19197 Private W. L. Lethbridge, 19322 Private H. Elliott, 19369 Private J. R. C. Scanlan, 19712 Private H. S. Tumber.

The following have passed in Group I.: 11250 Sergeant J. Sage, 12522 Sergeant S. Gallie, 10710 Sergeant J. Moore, 11812 Sergeant W. C. Banks, 9695 Sergeant F. Yeo, 19010 Bugler B. Bull, 19070 Private H. Siddall, 19320 Private H. Ritchie, 19732 Private H. Mayes, 19652 Private C. V. Jefford, 19784 Private H. J. Davey, 19282 Private H. Golden, 19396 Private H. Baker, 19924 Private E. D. Barr, 19899 Private H. Sinclair, 19771 Private G. C. Hurnell, 38 Private G. H. Caldwell, 19567 Private J. T. Christie, 24 Private P. H. Haynes, 19982 Private A. C. J. Steele, 70 Private J. Hanford, 96 Private E. L. McMurdo, 19207 Private W. R. Harris, 19543 Private F. E. Audus, 14009 Private M. Thompson, 19827 Private J. W. Baxter, 19663 Private N. C. Walton, 19665 Private H. G. Boxall, 12359 Private G. Lalor.

THE FOLLOWING HAVE QUALIFIED IN THE VARIOUS CORPS EXAMINATIONS FOR PROMOTION, &c.

For Sergeant-Major.—Sergeant-Major A. Harwood.

For Quartermaster-Sergeant.—7345 Quartermaster-Sergeant W. Deans, 9763 Staff-Sergeant E. J. Tillbury.

For Sergeant.—10183 Sergeant W. J. James, 13892 Corporal H. Dixon.

For Corporal.—18898 Private G. H. Green, 12547 Private A. Triggs, 13927 Private T. C. Wallace, 18974 Private R. Paul, 12712 Private W. Hutchinson, 17317 Private J. C. Reynolds, 11018 Private A. Lucas, 18921 Private W. H. Daling, 18447 Private J. E. Fakes.

As Compounders.—13892 Corporal H. Dixon, 14958 Corporal H. Soady.

EXTRACTS FROM CORPS ORDERS, DATED APRIL 2 and 23, 1906.

Promotions.—The following promotions, to complete establishment, will take effect from the dates specified:—

To be Sergeant-Majors.

No.	Rank and Name		Date of Casualty	Remarks
7877	Quartermaster-Sergeant	Kirk, E.	10.1.06	*Vice* H. A. Davidson, discharged to pension.
7848	,, ,,	Henfrey, W.	31.1.06	*Vice* J. M. Power, discharged to pension.
6760	,, ,,	Ford, J. F.	1.3.06	*Vice* F. Cronin, discharged to pension.
8260	,, ,,	Jones, F.	12.3.06	*Vice* S. Sulley, discharged to pension.
7397	,, ,,	Ford, H. J.		*Vice* W. Cooper, discharged to pension.
7553	,, ,,	Rapson, J. M.	27.3.06	*Vice* G. Greensill, discharged to pension.

To be Quartermaster-Sergeants.

7564	Staff-Sergeant	Ward, W.	2.4.06	
7839	,,	Powell, M.		
7734	,,	Lunney, E. G.		
7818	,,	Wilton, J.		
8556	,,	Barton, H.		
7879	,,	Simmons, J. D. ..		
8772	,,	Stevens, S.		
9135	,,	Senior, E. H.		

To be Staff-Sergeants.

8179	Sergeant	Barlow, G.	2.4 06	
8311	,,	Ward, A...		
9088	,,	Parnell, C.		
9697	,,	France, C. W.		
7799	,,	Porter, H.		
9929	,,	Banks, J.		
10659	,,	Hasler, A. T.		

To be Sergeants.

10271	Lce.-Sergeant	Jebson, J. R.	2.4.06	Special as Clerk.
12443	,,	Burns, H. G.		Nursing Section.
9747	,,	Williams, C.		,, ,,
11528	,,	Bannister, J.		,, ,,
10830	,,	Davidson, A.		,, ,,
12270	,,	Simmons, J.		,, ,,
15808	,,	Primer, C.		,, ,,
17938	,,	Dean, D. E.		,, ,,
11952	,,	Malley, A. E.		,, ,,
17568	,,	Steele, E.		,, ,,
17843	,,	Blair, R. C.		,, ,,
10442	,,	Dunglison, C.		,, ,,
18307	,,	Barker, F. H.		,, ,,
17644	,,	Hart, H. E.		,, ,,
17759	,,	Black, J.		,, ,,
10209	Corporal	Triggs, E.		,, ,,
12582	,,	Whiting, J.		,, ,,
6761	,,	Blatchford, J. F. ..		,, ,,
12340	,,	Butler, T.		,, ,,
17260	,,	Payne, G. W.		,, ,,

To be Corporals.

No.	Rank and Name		Date of Casualty	Remarks
12583	Lce.-Corporal	Ebbs, H.		General Duty Section.
12265	,,	Turpin, A. G. ..		Nursing Section.
18538	,,	Crandle, E. J. W. ..		General Duty Section.
12299	,,	Carbury, T. ..		Nursing Section.
9559	,,	Greaves, W. ..	2.4.06	Cooking ,,
9609	,,	Chipperfield, J. A. ..		,, ,,
9987	,,	Thorne, J. H. ..		General Duty Section.
11246	,,	Gross, J. W. ..		,, ,, ,,

Appointments.—The following appointments to Lance Rank will take effect from the date specified :—

To be Lance-Sergeant.

12987	Corporal	Walter, B.	2.4.06	Special as Superintending Cook and Instructor.

Queen Alexandra's Imperial Military Nursing Service.—The undermentioned non-commissioned officer and men have been selected for admission into Q.A.I.M.N.S. in accordance with paragraph 3 of Army Order 87 of 1904, with increased additional pay at sixpence (6d.) a day from the dates specified against their names :—

No.	Rank and Name		Date of Appointment	Station
17632	Lce.-Corporal	Lunn, H. C. A. ..	8.1.06	Woolwich.
12547	Private	Triggs, A.	2.3.06	Egypt.
16762	,,	Price, F.		

Nursing Section.—The undermentioned non-commissioned officer and men have been appointed to the Nursing Section of the Corps, from the dates specified against their names :—

No.	Rank and Name		Date of Appointment	No.	Rank and Name		Date of Appointment
51	Private	Coward, G. ..	18.12.05	19639	Private	Harris, J. ..	
17994	,,	Peers, J. ..		19652	,,	Jefford, C. V. ..	
18255	,,	Barber, A. ..	1.1.06	19658	,,	Gilbert, C. A. W.	
19435	,,	Webster, A. J...		19659	,,	Grant, H. ..	15.2.06
19559	,,	Steers, E. V. ..		19660	,,	Webb, A. J. ..	
19373	,,	Kitchener, W.		19687	,,	Dellagana, A. C.	
19457	,,	West, W. C. ..	8.1.06	19784	,,	Davey, H. J. ..	
19484	,,	Posner, W. T...		17258	,,	Pearce, F. W...	16.2.06
19601	,,	Miller, S. ..	9.1.06	19446	,,	Davies, D. ..	
14337	,,	Sadler, G. ..		19641	,,	Hardie, W. M.	17.2.06
17836	,,	Pratt, T. S. ..		19709	,,	Young, W. E...	
19322	,,	Elliott, H. ..	15.1.06	18889	,,	Brewer, W. G.	22.2.06
19369	,,	Scanlan, J. ..		19661	,,	Gill, E. ..	23.2.06
19456	,,	Flanagan, W. J.		16427	,,	Brennan, G. ..	26.2.06
8663	Lce.-Sgt.	Munden, W. ..	26.1.06	19634	,,	Kelliher, J. E.	
9320	Private	Butler, A. ..	1.2.06	19711	,,	Horstead, S. L.	7.3.06
19161	,,	Parkinson, G...		19605	,,	Nairn, M. ..	
19669	,,	Joyce, T. ..		19627	,,	Hedges, A. H...	
19690	,,	Fowler, A. ..	6.2.06	19646	,,	Gosling, H. T. S.	
19725	,,	Fairall, C. E. ..		19700	,,	Hopwood, C. F.	17.3.06
19741	,,	Pearson, J. ..		19748	,,	Parr, C. H. ..	
16266	,,	Talbot, R. S. ..	7.2.06	19758	,,	Manners, W. ..	
19578	,,	Webster, G. F.	15.2.06	19831	,,	Gale, R. C. ..	

Promotions.—(1) The undermentioned non-commissioned officers to be Staff Sergeants from the dates specified against their names, in accordance with paragraph 1866, King's Regulations:—

No.	Rank and Name		Date of Casualty	Remarks
6362	Sergeant	Goodchild, H. S. ..	15.1.06	Permanent Staff, R.A.M.C. Volunteers.
6001	,,	Ellison, G.	17.2.06	

(2) The undermentioned non-commissioned officers to be Sergeants from the dates specified against their names, on appointment as Instructors to the Auxiliary Forces, in accordance with paragraph 1863, King's Regulations:—

No.	Rank and Name		Date of Casualty	Remarks
10831	Corporal	Gregory, H. W. G. ..	22.12.05	Posted to York Co. R.A.M.C. (Militia).
17283	,,	Bullock, D.	6.3.06	Posted to No. 1 Aldershot Co. R.A.M.C. (Militia).

(3) The undermentioned non-commissioned officer to be Staff-Sergeant from the date specified against his name, on appointment as Instructor to the Auxiliary Forces, in accordance with paragraph 1859, King's Regulations:—No. 4673 Quartermaster Sergeant Paull, A., March 12, 1906, posted to Welsh Bearer Company, R.A.M.C. Volunteers.

Buglers.—The undermentioned Boy is appointed Bugler from the date specified against his name: No. 19267 J. Peacock, January 12, 1906.

Promotion Cancelled.—The promotion to Corporal of No. 13314, Lance-Corporal D. Lochiel, notified in Corps Orders of October 2, 1905, is hereby cancelled.

Reversions.—The undermentioned Lance-Corporals are reverted to their permanent rank from the date specified against their names: No. 14685 F. F. Crafer, November 6, 1905. No. 18917 H. Chadwick, January 26, 1906 (at own request).

Appointment Cancelled.—With reference to Corps Orders of January 1, 1906, the appointment of No. 17767 Private J. Harris to be Lance-Corporal is hereby cancelled.

NOTICES.

Promotions and Appointments.—With reference to the list of promotions and appointments to Lance-Rank, published in the present issue, it is desired to invite the attention of all non-commissioned officers and men to the fact that the strength has now been closely approximated to the establishment authorised for each rank and lance appointment in the Estimate of 1905—1906, and the discrepancies resulting from the expansion of the Corps during the South African War, which produced a surplus in some ranks and a deficiency in others, have now been nearly adjusted.

In accordance with instructions received from the War Office it is intended in future, so far as can be arranged, to promote and appoint to vacancies as they occur in the authorised numbers instead of "to complete establishment" as has been hitherto necessary.

Corps orders will still be issued quarterly, but, as far as is possible in a large Corps, the dates of promotion and appointments will be the dates of the casualties as they occur, qualified candidates being considered and selected from the Seniority Rolls in the Records Office.

Non-commissioned officers and men who desire advancement and who have not yet complied with the regulations laid down in the Standing Orders, R.A.M.C., are therefore recommended to obtained the necessary qualifications.

Promotions.—The following promotions, to complete establishment, will take effect from the dates specified :—

To be Sergeant-Major.

No.	Rank and Name		Date of Casualty	Remarks
7635	Qtrmaster-Sergt.	Ritchie, J.	8.4.06	*Vice* Sergt.-Major H. R. Burrows, discharged to pension.

To be Quartermaster-Sergeants.

9208	Staff-Sergt.	Edser, E.	8.4.06	*Vice* Quartermaster-Sergt. J. Ritchie, promoted.
9263	,,	Brennan, W. ..	9.4.06	*Vice* Quartermaster-Sergt. E. Dyer to Auxiliary Forces.
9258	,,	O'Hara, E.	12.4.06	*Vice* Quartermaster-Sergt. R. Hughes to Auxiliary Forces.

To be Staff-Sergeants.

8879	Sergeant	Wells, W. J. ..	3.4.06	On increase of establishment, 1906-7.
9722	,,	Tite, W. J.		
10142	,,	Cardwell, T. W. ..	8.4.06	*Vice* Staff-Sergeant E. Edser, promoted.
8938	,,	Caseley, F.	9.4.06	*Vice* Staff-Sergeant W. Brennan, promoted.
8703	,,	Traynier, H. G. M.	12.4.06	*Vice* Staff-Sergt. E. O'Hara, promoted.
8994	,,	Kingston, C. ..	14.4.06	*Vice* Staff-Sergeant T. Johnstone to Auxiliary Forces.
10064	,,	Elliott, C.	19.4.06	*Vice* Staff-Sergeant C. Hunt to Auxiliary Forces.
10544	,,	Granger, T. W. ..	20.4.06	*Vice* Staff-Sergeant T. Jackson, discharged.

To be Sergeants.

9207	Corporal	Hillier, N.	3.4.06	To complete establishment.
13892	,,	Dixon, H.	21.4.06	,, ,,

To be Corporals.

12487	Lce.-Corpl.	Halliday, C. ..	3.4.06	Nursing Section	On increase of establishment, 1906 and 1907
11691	,,	Hayter, J.		,, ,,	
11807	,,	Levey, J.		,, ,,	
11896	,,	Spackman, A. P. ..		,, ,,	
11929	,,	Cooper, W. J. ..		,, ,,	
12195	,,	Joyce, A.		Cooking ,,	
12223	,,	Drake, A. L. ..		Gen. Duty ,,	
12242	,,	Luxton, A. J. ..		Nursing Section, *vice* Hillier, promoted.	
12261	,,	Green, J. E. ..		General Duty Section, *vice* Smith, discharged.	
12457	,,	Wyness, W. ..	13.4.06	Cooking Section, *vice* Jackson to Auxiliary Forces.	
12650	,,	Wyke, E.	21.4.06	General Duty Section, *vice* Dixon, promoted.	

Appointments.—The following appointments to Lance rank will take effect from the dates specified :—

To be Lance-Sergeants, as Compounders of Medicine.

No.	Rank and Name		Date of Casualty	Remarks
8477	Corporal	Gregson, G. G. ..	3.4.06	To complete establishment.
10714	,,	Kerns, T... ..		,, ,, ,,
10518	,,	Brice, E. G. I. ..	13.4.06	*Vice* Lance-Sergeant A. Jackson to Auxiliary Forces.

Auxiliary Forces.—The under-mentioned Non-Commissioned Officers to be Staff-Sergeants from the dates specified against their names, on appointment as Instructors to the Auxiliary Forces, in accordance with paragraph 1859, King's Regulations :—

No.	Rank and Name		Date of Casualty	Remarks
7151	Qtrmaster.-Sergeant	Dyer, E.	9.4.06	Posted to Woolwich Cos., R.A.M.C.(Vols.).
6648	,, ,,	Hughes, R... ..	12.4.06	Posted to Hants. Vol. Infantry Brigade Bearer Co.

Promotion.—The undermentioned Non-Commissioned Officer to be Sergeant, from the date specified against his name, on appointment as Instructor to the Auxiliary Forces, in accordance with paragraph 1863, King's Regulations :—

No.	Rank and Name		Date of Casualty	Remarks
9299	Lce.-Sergt.	Jackson, A... ..	13.4.06	Posted to Glasgow Cos., R.A.M.C.(Militia).

NOTES FROM PORTSMOUTH.—Captain E. W. Bliss, R.A.M.C., writes (April, 1906): "That the last monthly meeting for the winter session of the Portsmouth Military Medical Society was held in the Library of the Military Hospital at 6 p.m. on April 19, Colonel Morris, R.A.M.C., A.M.O., being in the chair, and nearly all the medical officers in the station being present. The Volunteer Medical Officers were invited to attend. A most interesting and instructive Essay on 'Medical Arrangements on Service' was read by Lieutenant-Colonel Magrath, R.A.M.C. The Essay was an essentially practical one, and great stress was laid upon the advantages of preparedness for service under all conditions, and the advantages likely to accrue from the appointment of a Staff Medical Officer in all parts where there is any likelihood of active service occurring, who should gather all information possible as to the country, its resources for transport, housing of sick, &c. An interesting discussion followed, in which several officers took part. The general opinion seemed to be that, though it was of real advantage to have high sanitary ideals on active service, it was extremely difficult to carry them out under the varying conditions met with. Surgeon Richards, R.N., showed some excellent specimens and photographs of the various forms of Spirochetes. Captain Bliss, R.A.M.C., showed a specimen of trypanosomes from a case of sleeping sickness in Sierra Leone. The meeting concluded with a vote of thanks to Lieutenant-Colonel Magrath and Surgeon Richards.

"*Moves during the Month.*—Captain E. V. Aylen, R.A.M.C., joined the station for duty from Wei-hai-wei. Major J. C. Connor, R.A.M.C., proceeded to Winchester for temporary duty during the absence on leave of Lieutenant-Colonel C. G. D. Mosse. Captain M. P. Corkery has been granted leave from April 7 to May 3.

"*Operations.*—Some interesting surgical operations have been performed during the month; included in these were operations for brain tumour, complete mastoid operation, for carcinoma testis, inguinal hernia, &c.

"(May 15, 1906).—At a meeting held in the Officer's Room, on Wednesday, May 9, it was decided to increase the monthly subscription to form a fund for the purchase of medical and surgical books of reference for the use of officers doing duty at the station.

"A cricket match, played against No. 67 Company, R.G.A., on May 9, was lost. Captain H. L. W. Norrington, R.A.M.C., batted well for 65 not out. Scores: R.G.A. 168, R.A.M.C. 108. A very weak team turned out to play the Army Ordnance Corps on May 12, resulting in a defeat. Scores: A.O.C. 201; R.A.M.C. 42.

"I regret to report the death of No. 7091 Private A. E. Gough, R.A.M.C., whose funeral took place with full military honours at Kingston Cemetery on May 7. Besides the headquarters of No. 6 Company, parties attended from Netley, Gosport and Hilsea, to pay their last respects. Several beautiful wreaths were sent by the Officers, R.A.M.C., W.O.'s, N.C.O.'s and men of No. 6 Company, Nursing Sisters, Military Hospital, Portsmouth, and from his comrades at Netley.

"Captain M. P. Corkery, R.A.M.C., returned from leave May 3, 1906.

"A most enjoyable 'At Home' was given at the Military Hospital by Miss Clay and the Sisters, Q.A.I.M.N.S., on May 3, when progressive croquet and badminton were played. Prizes were presented by Miss Clay to the successful competitors, and also Booby prizes, for which there was great competition. Tea was provided in the Officer's Library.

"A good story comes from the hospital ship 'Maine.' The most unhappy of all the invalids was a man of the Royal Army Medical Corps, who had been laboratory assistant at Malta. He was endeavouring to assist the Commission by blowing dust, impregnated with the bacilli of Malta fever, down a monkey's throat, when unfortunately the monkey blew first."

NOTES FROM BLOEMFONTEIN.—Major S. F. Clark, R.A.M.C., writes (April 2 1906): "A sad accident happened on March 25, by which Private Gray, one of our detachment, lost his life. A number of the men went out for a pic-nic, and during the afternoon some of the party bathed in the 'dam' at Glen. Private Gray, who could not swim, also went into the water, but got out of his depth and was drowned, in spite of a good effort by Private Humphreys to save him. Deceased was a steady, well-conducted man, and he was buried next day with full honours. Several of the officers and nursing sisters, and all available N.C.O.'s and men, attended the funeral, the Northumberland Fusiliers providing the band and firing party.

"Lieutenant-Colonel W. J. Macnamara, our Principal Medical Officer, has gone home on leave, and Lieutenant-Colonel R. Porter, who has just returned, is acting in his place. Before the former went all the officers attended a dinner in his honour, at which Colonel Porter proposed his health in a happy speech, and voiced the feelings of all present when he said that he hoped to see the guest of the evening back again on the expiration of his leave. Colonel Macnamara, in his reply, pointed out several previously unsuspected ways of obtaining a competence in civil life.

"Our Cricket Team finished its season with a return match against the 5th Dragoon Guards. We made 88, due mainly to the efforts of Private Walton, who hit hard for 40 not out, and a recruit in Lieutenant Dudding, who surprised us with a capital 21. Beyond saying that they collared us for the loss of 3 wickets, we will draw a veil over the subsequent proceedings. Although only one win came our way, yet nobody except this regiment beat us badly during the season; but unless the men take more interest in the game we shall never be efficient as a cricket team, whatever we may be at hospital work. The astonishing thing is that we did so well as we did, when our limited batting and bowling and our untrustworthy fielding is taken into consideration.

"The climate here at present is delightful; the great heat has gone, the over-powering dust has been laid by the rain, and the air has a refreshing touch of autumn in it."

NOTES FROM HONG KONG.—Captain J. T. Johnson, R.A.M.C., writes (March 24, 1906): "The weather is now getting warm again, and for a week the Peak has been completely enveloped in fog, a great source of discomfort at this season of the year to officers quartered there.

"The General Officer Commanding made his annual inspection of the hospital last week, and expressed himself as very satisfied with the general appearance of the detachment on parade.

"Colonel A. W. P. Inman, R.A.M.C., has been appointed Principal Medical Officer, South China, in succession to Colonel W. E. Webb, who has retired, but has been granted six months' sick leave. Lieutenant-Colonel C. L. Josling, R.A.M.C., is going on

three months' leave to Japan, from April 11. During his absence the duties of acting Principal Medical Officer will be performed by Lieutenant-Colonel C. S. Sparkes, R.A.M.C., and Officer in Charge Military Hospital by Major T. P. Jones, R.A.M.C.

"This week the harbour is very full, as a section of the French Fleet from Saigon (Indo-China), a Japanese training squadron, and one or two German and American men-of-war have arrived; two transports full of Russian troops from Vladivostock for Russia, *via* Suez Canal, have also arrived. All these various nationalities were presented at a Government House 'At Home' on the 23rd, and on the 24th the Navy and Army gave a Gymkhana on the Polo Ground, which was largely attended and thoroughly enjoyed by all, the Japanese and French visitors taking part in several of the events."

NOTES FROM MALTA.—Captain J. Crawford Kennedy, R.A.M.C., writes (May 12, 1906): "There have been many changes in the *personnel* of the Command during the last three months; the officers are distributed throughout the Command as follows: *Principal Medical Officer.*—Colonel J. G. MacNeece. *Sanitary Officer.*—Major W. S. Gray. *Military Hospital, Valletta.*—Lieutenant-Colonel R. Jennings (in charge), Major C. B. Lawson (bacteriologist), Major Pollock (specialist in venereal disease), Major Williams (in charge of Families' Hospital), Captain E. Ryan (company officer), Lieutenants Winckworth and Roberts, Quartermasters Captain E. Lines and Lieutenant G. Allen. *Military Hospital, Cottonera.*—Lieutenant-Colonel J. H. Rhodes (in charge), Major Fleming, D.S.O. (company officer), Captain Anderson. *Military Hospital, Forrest.*—Major Gerrard, Captain J. H. Winder. *Military Hospital, Citta Vecchia.*—Major Trotter. *Military Hospital, Imtarfa.*—Major Crawford. *Ghain Tuffeiha Camp.*—Lieutenant Lloyd-Jones. *Medical Officer, Sliema.*—Major Fleury. *Military Hospital, Gozo.*—Lieutenant Meredith.

"The following officers are on leave: Lieutenant-Colonel H. M. Sloggett, Lieutenant-Colonel J. H. Nicolls, Captain H. A. Bransbury.

"Captain J. C. Kennedy is tour expired, but is retained supernumerary to the strength for the purposes of the Mediterranean Fever Commission. Lieutenant L. Bousfield having been seconded for service with the Egyptian Army, left on April 23 on the s.s. 'City of Athens,' along with the 1st Battalion Lancashire Fusiliers, who were suddenly ordered to Egypt. On May 9, the 4th Battalion Worcester Regiment also sailed for Egypt in the 'Dilwara'; Captain Anderson accompanied them in medical charge. Lieutenant Roberts is under orders to relieve Lieutenant Lloyd-Jones at Ghain Tuffeiha.

"The Mediterranean Fever Commission has now started its summer campaign. This year the members are, with the exception of Dr. T. Zammit and Captain Kennedy, all new, and arrived in Malta six weeks ago, accompanied by Colonel Bruce, C.B., F.R.S., who superintended the preliminary organising. The new members are: Majors T. McCulloch, J. C. Weir, and J. G. McNaught, R.A.M.C., Staff-Surgeon Clayton, R.N., and Dr. Eyre, of Guy's Hospital. Much energy is being infused into the work, and many important experiments, especially of an epidemiological nature, are being carefully studied. It is hoped that the results of this summer's work may be of a definite nature and go a long way to decide in what way prevention can best be carried out.

"The Officer's Monthly Meeting has been held regularly and many interesting papers have been read and discussed. Among the most interesting papers were: (1) 'A Case of Pneumonia and Septicæmia, with Secondary Abscesses in the Spleen, Liver, Kidneys, and Heart Wall.' There was also found a large calculus which had caused great distension of the ureter. The suggestion that the calculus was the primary cause of the septicæmic infection was discussed and dismissed. An abscess in the heart wall was found by Major Lawson to contain Friedländer's pneumo-bacillus and a staphylococcus. (2) 'Carious Teeth and their Relation to Malta Fever,' by Lieutenant Bousfield. (3) 'A Fatal Case of Malta Fever, with two patches of Ulceration in the Intestines,' also by Lieutenant Bousfield. Although the patches were very suggestive of enteric, no trace of *B. typhosus* was found in the spleen or the mesenteric glands. The Quarterly Dinner was held in the Union Club, on Wednesday, April 25, Colonel MacNeece presiding over a very large gathering. The guests of the evening were: Colonel Bruce, C.B., Majors McCulloch, Weir, and McNaught, Staff-Surgeons Shaw and Clayton, R.N., and Dr. Eyre. The toasts were enthusiastically drunk and suitably answered. A very enjoyable evening was spent.

"*Sports.*—The football season closed last month and the detachment in Malta has to congratulate itself on the creditable position it has obtained in the league. To have

sixth place in a league of twelve is very good considering the disparity between the strength of the Corps and of the Regiments and other Corps from which the other competing teams are drawn. Of eleven matches the Corps won four, lost six and drew one, scoring 13 goals to 20. In the Governor's Cup the Corps was drawn against the 4th Battalion Worcester Regiment, and when time was called the score stood 2 goals all. On playing extra time our team went to pieces, and 4 goals were scored against us in the extra quarter. We feel, however, that we came very near the Cup, seeing that the Worcesters came out winners, easily beating the 1st Rifle Brigade in the final round. The cricket season has just been opened by a friendly between the detachments at Valletta and Cottonera Hospital. Cottonera had the best of the day—thanks to the excellent batting of Private Fish—being able to keep Valletta fielding while they compiled 142 for 7 wickets, before declaring. Private Fish played a very fine innings of 79 not out. The Valletta team replied with 80 for 8 wickets when stumps were drawn. Several new arrivals in the station have come out with reputations, and it is hoped that we shall be able to put in a good Corps team for the Governor's Cup, even though we have lost one or two valuable members of last year. At the Corps Recreation Meeting, the following were elected office bearers for the season :—*Captain:* Captain Kennedy. *Vice-Captain:* Private Fish. *Selecting Committee:* Sergeant-Major Green, Quartermaster-Sergeant Dudman, Corporal Johnson. *Secretary:* Private Cowx.

"The Annual Tournament of the Garrison Tennis Club was held a week ago, and the Corps was represented by Lieutenants Bousfield and Winckworth, who entered for the Open and Handicap Singles, the Ships' and Regiments' Doubles, and the Handicap Doubles. Captain Kennedy and Lieutenant Roberts also entered for the Handicap Doubles. It was a great disappointment when, half way through the Tournament, Lieutenant Bousfield got sudden orders for Egypt and had to scratch. He had been so far unbeaten, and it was confidently expected that he would win the open event, and also, along with Lieutenant Winckworth, win the Doubles for the Corps. Mrs. Gray and Lieutenant Winckworth were the runners up in the Mixed Doubles, which they had hard lines in not winning. The Warrant and Non-Commissioned Officers' Tennis Club is also holding a Tournament, and the Royal Army Medical Corps team has reached the final round."

NOTES FROM SIERRA LEONE.—Captain A. H. Morris, R.A.M.C., writes (April 28, 1906): "Captain E. W. W. Cochrane, R.A.M.C., left for England, tour expired. Captain A. W. N. Bowen, R.A.M.C., has taken over charge of the Military Hospital, Wilberforce. Captain J. Cowan, R.A.M.C., arrived for duty and has been posted to the Military Hospital, Mount Aureol. Captain J. McCarthy, R.A.M.C., has been posted to Batkana, the new station in the Protectorate for a company of the West African Regiment.

"On April 19 Lieutenant-Colonel A. A. Sutton, D.S.O., and the Officers R.A.M.C., gave an 'At Home' at King Town. The programme, which is given below, was much appreciated. Some of the events caused great amusement, and a most enjoyable afternoon was spent.

"*Programme of Events.*—(1) Potato sticking from hammocks; (2) costume race; (3) menagerie race; (4) lighting a candle on a champagne bottle; (5) blindfold driving obstacle race; (6) hammock race; (7) band race.

"Lieutenant-Colonel Sutton, D.S.O., our S.M.O., sails for England this week, tour expired. His departure will be universally regretted, and we all wish him *bon voyage.* Lieutenant-Colonel C. R. Bartlett arrives by this mail to take over the duties of S.M.O."

NOTES FROM SIMLA (INDIA).—Captain E. Blake Knox, R.A.M.C., Secretary to Principal Medical Officer, His Majesty's Forces in India, writes (April 19, 1906):—

"*Appointments.*—Colonel O. E. P. Lloyd, V.C., as Principal Medical Officer, Jubbulpore and Jhansi Brigades. Colonel R. H. Forman, as Principal Medical Officer, Bombay Brigade. Lieutenant-Colonel J. Meek, as Sanitary Officer, Western Command. Captain R. Selby, as Specialist in Dermatology, Meerut Division. Captain G. B. Riddick, as Staff Surgeon, Fort William, Calcutta. Lieutenant-Colonel W. A. Morris, to command Station Hospital, Murree. Lieutenant-Colonel W. E. Berryman, to command Station Hospital, Muttra. Lieutenant-Colonel M. J. Sexton, to command Station Hospital, Chakrata. Lieutenant-Colonel R. G. Hanley, to command Station Hospital, Kuldanna. Lieutenant-Colonel S. G. Allen, to command Station Hospital, Kalabagh. Lieutenant-Colonel J. M. F. Shine, to command Station Hospital, Jhansi.

Lieutenant-Colonel G. F. Gubbin, to command Station Hospital, Colaba. Major G. Scott, to command Station Hospital, Gharial. Major J. J. Russell, to command Station Hospital, Sialkot. Major R. Holyoake, to command Station Hospital, Solon. Major J. B. Buchanan, to command Station Hospital, Barrackpore. Major J. Donaldson, to command Station Hospital, Agra. Major C. W. Duggan, to command Station Hospital, Lebong. Major W. Tibbits, to command Station Hospital, Delhi. Major O. R. A. Julian, C.M.G., to command Station Hospital, Cherat. Captain F. S. Walker, to command Station Hospital, Khyragali, also to medical charge School of Musketry, Changla Gali. Captain H. W. Long, to command Station Hospital, Upper Topa. Captain B. S. Bartlett, to command Station Hospital, Fort Allahabad. Lieutenant J. A. Turnbull, to command Station Hospital, Khanspur. Lieutenant H. T. M. Wilson, to command Station Hospital, Lower Topa. Lieutenant R. H. L. Cordner, to command Station Hospital, Bara Gali. Lieutenant A. W. Gater, to command Station Hospital, Ghora Dhaka. Lieutenant S. M. W. Meadows, to take Charge of Station Family Hospital, Cliffden. Captain M. W. Falkner, to do duty, Station Hospital, Lucknow. Lieutenant F. J. Turner, to do duty, Station Hospital, Aden. Lieutenant C. D. M. Holbrooke, to do duty, Station Hospital, Poona. Lieutenant E. B. Booth, to do duty, Station Hospital, Jhansi.

"*Transfers.*—Captain A. D. Waring, to Home Establishment. Captain M. F. Foulds, to Station Hospital, Deolali. Lieutenant S. C. Bowle, to Station Hospital, Saugor.

"*Leave.*—The undermentioned officers have been granted leave out of India: Lieutenant-Colonel C. E. Faunce, for six months, on medical certificate, from March 31, 1906. Lieutenant H. B. Kelly, for six months, on medical certificate, from May 1, 1906. Lieutenant D. Ahern, for six months, on medical certificate, from March 7, 1906. Lieutenant R. Rutherford, for six months, on medical certificate, from March 31, 1906. The undermentioned officers have been granted leave in India: Captain J. G. Berne, for three months, on medical certificate, from March 27, 1906. Captain H. G. Pinches, for three months, from April 1, 1906. Captain T. H. M. Clarke, for two and a-half months, from April 15, 1906. Captain G. T. K. Maurice, for three months, from April 16, 1906. Captain W. M. Power, for two months, on private affairs, from April 1, 1906. Lieutenant T. E. Harty, for two months, from April 9, 1906. The undermentioned officers have been granted privilege leave: Lieutenant-Colonel H. G. Hathaway, for ninety days, from April 4, 1906. Lieutenant-Colonel F. W. C. Jones, for ninety days, from April 2, 1906. Captain A. W. Gibson, for ninety days, from March 14, 1906.

"*Examinations.*—The undermentioned officers passed in (*h*) *i* on the dates specified against their names for promotion to the rank of Captain: Lieutenant G. A. Kempthorne, March 31, 1906. Lieutenant M. D. Ahern, January 31, 1906.

"*Embarkations.*—The undermentioned officers sailed for England on March 30, 1906, tour expired: Major C. R. Elliott, and Captains C. R. L. Ronayne and R. F. Ellery.

"*Arrivals.*—Colonel G. D. N. Leake, on March 6, 1906, and has resumed charge of his duties as Principal Medical Officer, 8th (Lucknow) Division."

QUEEN ALEXANDRA'S IMPERIAL MILITARY NURSING SERVICE.

Miss Sidney J. Browne, R.R.C., Matron-in-Chief, Q.A.I.M.N.S., is placed on retired pay, dated April 5, 1906.

Miss Browne was appointed to the late Army Nursing Service, July 1, 1883; was promoted Superintendent May 29, 1887, and appointed Matron-in-Chief of Q.A.I.M.N.S., April 4, 1902. Her War Services are as follows: Served in Egypt from March, 1884, to July, 1885, Suakin Expedition and Hospital Ship "Ganges"; medal with clasp "Suakin," Khedive's bronze star. South African War, 1899 to 1902. Superintendent No. 3 General Hospital, Rondebosch, and afterwards of No. 12, General Hospital, Springfontein. Operations in Cape Colony and Orange River Colony. Mentioned in Despatches, *London Gazette*, September 10, 1901. Queen's medal and King's medal. Decoration of R.R.C. for service in South Africa. Miss Browne also possesses the King's Coronation Medal.

Miss Browne was ordered home from South Africa to take up the first appointment of Matron-in-Chief at Headquarters. This position she held from April 4, 1902, to date of retirement.

The Director-General wishes to place on record the high appreciation in which Miss Browne has been held by himself and by all with whom she had come into official relation, not only as Matron-in-Chief, but throughout her career as an Army Nurse.

He feels that, under the Presidency of Her Majesty, Miss Browne has been instrumental in effecting such a re-organisation of the Nursing Service as has given rise to an immense increase in nursing efficiency in Military Hospitals. The single heartedness with which Miss Browne devoted herself to this work stands as an example to all Members of Queen Alexandra's Imperial Military Nursing Service to likewise devote themselves heart and soul to both the care of the sick soldier and the training of the Nursing Section of the Royal Army Medical Corps, perfection in which is the sure index that the Nursing Service is fulfilling the high purpose of its profession.

On April 19 a complimentary dinner was given at the Savoy Hotel to Miss Browne by the Director-General and Officers at Headquarters. The other guests invited to meet her were Miss C. H. Keer, R.R.C., who has been appointed Matron-in-Chief, Miss E. H. Becher, R.R.C., Principal Matron at Headquarters, and Miss Lucas, Secretary.

The following ladies have received appointments as Staff Nurses: Miss S. G. M. Rogers, Miss A. R. Sibbald, Miss I. J. Egerton, Miss V. L. Batteson, Miss F. E. Manfield, Miss C. V. S. Johnson.

Postings and Transfers.—Matron: Miss L. W. Tulloh, R.R.C., to Royal Infirmary, Dublin, from Military Hospital, Canterbury. Sisters: Miss A. Guthrie, to Military Hospital, Harrismith, Orange River Colony, South Africa, from Middleburg, Cape Colony; Miss A. Nixon, to Royal Victoria Hospital, Netley, on return from South Africa; Miss A. S. Bond, R.R.C., to Military Hospital, Canterbury, from Royal Victoria Hospital. Netley; Miss M. E. Harper, R.R.C., to South Africa, from Sick Leave at Home; Miss K. M. Hewetson, to Royal Victoria Hospital, Netley, from Royal Military College, Sandhurst; Miss S. K. Bills, to Military Hospital, Curragh, from the Queen Alexandra Military Hospital, Millbank. Staff Nurses: Miss S. G. M. Rogers, to Royal Herbert Hospital, Woolwich, on appointment; Miss C. A. Coats, to the Queen Alexandra Military Hospital, Millbank, on appointment; Miss C. V. S. Johnson, to Cambridge Hospital, Aldershot, on appointment; Miss F. E. Manfield, to Royal Victoria Hospital, Netley, on appointment.

Appointments Confirmed.—Staff Nurses: Miss E. Close, Miss L. M. Draper.

Death of Miss M. Kendall, Sister, Q.A.I.M.N.S.

The following is an extract from a South Africa paper: "A very impressive funeral service was held in St. John's Cemetery, Wynberg, on Sunday afternoon, April 9, on the occasion of the interment with full military honours of Miss Margaret Kendall, a young Sister of Queen Alexandra's Imperial Military Nursing Service, who has been stationed with a branch of that service at the Military Hospital, Wynberg Camp, and who had died on the previous day after a few days' illness. Miss Kendall had been in South Africa some short six months, and in her brief period of service endeared herself to every member of the military community with whom she had been associated. No higher tribute of praise to a beautiful life could have been offered than that paid to this lady's memory by the Reverend Rice Thomas, Chaplain to the Forces, in his address to the troops at the parade service on Sunday morning. The Pall bearers were Lieutenant-Colonel Heffernan, R.A.M.C., Major Merritt, R.A.M.C., Captain Short, R.A.M.C., Lieutenant Ievers, R.A.M.C., and two Lieutenants of the 2nd Battalion Yorkshire Regiment.

ARMY MEDICAL RESERVE OF OFFICERS.

Surgeon-Captain Thomas Holt, M.B., to be Surgeon-Major, dated April 7, 1906.

ROYAL ARMY MEDICAL CORPS (MILITIA).

Robert Johnstone Stirling, Gent., to be Lieutenant, dated April 11, 1906.

Surgeon-Captain Samuel Macfarlane Sloan, M.B., Army Medical Reserve of Officers (late Captain, Scottish Command, Glasgow Companies, Royal Army Medical Corps Volunteers), to be Captain, dated March 15, 1906.

Supernumerary Lieutenant (Honorary Lieutenant in the Army) G. Lane, to be Captain, remaining seconded, dated March 30, 1906.

Captain and Honorary Major (Honorary Captain in the Army) A. H. Benson resigns his Commission, with permission to retain his rank, and to wear the prescribed uniform, dated May 12, 1906.

IMPERIAL YEOMANRY.

Herts.—Surgeon-Lieutenant F. E. Fremantle, M.B., to be Surgeon-Captain, dated May 12, 1906.

ROYAL ARMY MEDICAL CORPS (VOLUNTEERS).

Northern Command; Manchester Companies.—Charles Russell Corfield, Gent., to be Quartermaster, with the honorary rank of Lieutenant, dated May 12, 1906.

Lieutenant G. Ashton, M.D., to be Captain, dated May 5, 1906.

Highland Light Infantry Bearer Company.—James Alexander Hamilton Aitken, M.B., to be Lieutenant, dated April 28, 1906.

2nd London Bearer Company.—Captain J. N. Brown, M.D., is appointed Brigade-Surgeon-Lieutenant-Colonel, whilst employed as Senior Medical Officer of the 2nd London Volunteer Infantry Brigade, dated April 1, 1906.

Worcester and Warwick Bearer Company.—George William Craig, Gent., to be Lieutenant, dated April 28, 1906.

North-east Lancashire Bearer Company.—Captain T. Holt, M.B., to be Major, dated May 12, 1906.

OTHER VOLUNTEER CORPS.

1st Volunteer Battalion, The Northumberland Fusiliers.—Surgeon-Major J. P. Elliot is granted the honorary rank of Surgeon-Lieutenant-Colonel, dated April 11, 1906. Surgeon-Major and Honorary Surgeon-Lieutenant-Colonel J. P. Elliot resigns his Commission, with permission to retain his rank and to wear the prescribed uniform, dated April 11, 1906.

5th (Glasgow Highland) Volunteer Battalion, The Highland Light Infantry.—Surgeon-Major A. Macphee, M.D., to be Surgeon-Lieutenant-Colonel, dated April 11, 1906.

4th Volunteer Battalion, The Royal Fusiliers (City of London Regiment).—Supernumerary Surgeon-Lieutenant-Colonel and Honorary Surgeon-Colonel W. D. Waterhouse resigns the Appointment of Brigade-Surgeon-Lieutenant-Colonel (Senior Medical Officer) 2nd London Volunteer Infantry Brigade, dated April 1, 1906.

4th Volunteer Battalion, The Norfolk Regiment.—Surgeon-Captain C. A. O. Owens, M.D. (Brigade-Surgeon-Lieutenant-Colonel, Senior Medical Officer, Norfolk Volunteer Infantry Brigade), to be Surgeon-Major, dated August 1, 1902.

5th (The Hay Tor) Volunteer Battalion, The Devonshire Regiment.—Walter Fitzpatrick, Gent., to be Surgeon-Lieutenant, dated April 28, 1906.

1st Volunteer Battalion, The Leicestershire Regiment.—Surgeon-Lieutenant B. Stracey, M.B., resigns his Commission, dated April 28, 1906.

4th Volunteer Battalion, The Cameronians (Scottish Rifles).—Alexander Bankier Sloan, M.D., to be Surgeon-Lieutenant, dated April 28, 1906.

2nd Volunteer Battalion, The Queen's Own (Royal West Kent Regiment).—Surgeon-Lieutenant-Colonel H. W. Roberts is granted the honorary rank of Surgeon-Colonel, dated April 28, 1906.

14th Middlesex (Inns of Court) Volunteer Rifle Corps.—Surgeon-Major H. M. Ramsay resigns his Commission, dated April 9, 1906.

1st Aberdeenshire, Royal Garrison Artillery (Volunteers). — Surgeon-Captain H. McI. W. Gray, M.B., resigns his Commission, dated May 5, 1906.

3rd Durham, Royal Garrison Artillery (Volunteers).—Henry Goudie, Gent., to be Surgeon-Lieutenant, dated May 5, 1906.

3rd Lancashire, Royal Garrison Artillery (Volunteers).—Thomas Marshall Scott, Gent. (late Lieutenant), to be Surgeon-Lieutenant, dated May 5, 1906.

1st Shropshire and Staffordshire, Royal Garrison Artillery (Volunteers).—Surgeon-Lieutenant-Colonel and Honorary Surgeon-Colonel E. Cureton resigns his Commission, with permission to retain his rank and to wear the prescribed uniform, dated May 5, 1906.

3rd Volunteer Battalion, The Queen's (Royal West Surrey Regiment).—Surgeon-Captain C. Boyd is granted the honorary rank of Surgeon-Major, dated May 5, 1906.

21st Middlesex (The Finsbury) Volunteer Rifle Corps.—Surgeon-Lieutenant W. A. Malcolm, M.B., to be Surgeon-Captain, dated April 21, 1906.

1st Argyll and Bute, Royal Garrison Artillery (Volunteers).—John Stewart, Gent., to be Surgeon-Lieutenant, dated May 12, 1906.

3rd Lancashire, Royal Garrison Artillery (Volunteers).—Surgeon-Major M. J. Fox is granted the honorary rank of Surgeon-Lieutenant-Colonel, dated May 12, 1906.

1st Sussex, Royal Garrison Artillery (Volunteers).—Surgeon-Lieutenant H. H. E. Scatliff resigns his Commission, dated May 12, 1906.

1st Sussex, Royal Engineers (Volunteers).—Antony Alexander Martin, M.D., to be Surgeon-Lieutenant, dated April 10, 1906.

3rd Volunteer Battalion, The Cheshire Regiment.—Surgeon-Major T. Fennell is granted the honorary rank of Surgeon-Lieutenant-Colonel, dated May 12, 1906.

1st Volunteer Battalion, The Durham Light Infantry.—Surgeon-Lieutenant A. J. Dale resigns his Commission, dated April 9, 1906.

5th (Glasgow Highland) Volunteer Battalion, The Highland Light Infantry.—Surgeon-Major G. Bed Todd, M.B., to be Surgeon-Lieutenant-Colonel, dated May 12, 1906.

1st (Ross Highland) Volunteer Battalion, Seaforth Highlanders (Ross-shire Buffs, The Duke of Albany's).—Surgeon-Lieutenant-Colonel J. Adam M.D., is borne as supernumerary whilst holding the appointment of Brigade-Surgeon-Lieutenant-Colonel, Senior Medical Officer, Seaforth and Cameron Volunteer Infantry Brigade, dated May 12, 1906.

VOLUNTEER OFFICERS' DECORATION.

The King has been graciously pleased to confer the Volunteer Officers' Decoration upon the undermentioned Medical Officers of the Volunteer Force, who have been duly recommended for the same under the terms of the Royal Warrant, dated July 25, 1892:—

20th Middlesex (Artists') Volunteer Rifle Corps.—Surgeon-Captain and Honorary Surgeon-Major Charles Sempill de Segundo, M.B.

4th Volunteer Battalion, The Manchester Regiment.—Surgeon-Lieutenant (Honorary Major, Volunteers) John Crawhall Nichol, M.D.

1st Renfrew and Dumbartonshire Royal Garrison Artillery (Volunteers).—Surgeon-Lieutenant-Colonel William Robert Sewell, M.D.

1st Devonshire Royal Garrison Artillery (Volunteers).—Surgeon-Lieutenant George Clement Searle.

2nd Volunteer Battalion, The South Staffordshire Regiment.—Surgeon-Major James Scott Wilson, M.D.

1st Volunteer Battalion, The King's (Shropshire Light Infantry).—Surgeon-Major and Honorary Surgeon-Lieutenant-Colonel William Herbert Packer, M.D.

ROYAL ARMY MEDICAL COLLEGE.

Examination of Captains for Promotion to Major.

Midwifery and Gynæcology.—(Special subject). Saturday April 28, 1906. From 2 to 5 p.m.

(1) Describe the management of labour in a case of breech presentation. What difficulties may arise in the delivery of the breech and how may they be met?

(2) What are the indications for induction of labour? Mention the particular methods suitable for each case.

(3) Give the causes and state what treatment you would employ in a case of severe antepartum hæmorrhage.

(4) What do you understand by the term "puerperal sapræmia"? How do you recognise this condition clinically, and how would you treat it?

(5) What are the symptoms and signs of tubal gestation in the early weeks? Give the differential diagnosis.

(6) How would you investigate the case of a woman aged 50, suffering from an offensive vaginal discharge?

Dermatology and Venereal Diseases.—(Special subject). Monday, April 30, 1906. Commencing 3 p.m.

(1) Describe the lesions which tertiary gummatous syphilis may produce in the skin, and how they may be diagnosed independently of the history of syphilis.

(2) What are the symptoms and treatment of any three diseases of the skin directly due to pus cocci (strepto- or staphylo-cocci)?

(3) Describe a typical case of psoriasis and the points which differentiate that disease from other conditions which may resemble it.

(4) What are the distinguishing features of the eruptions caused by bromides and iodides? Under what conditions are they especially liable to occur? Give the diagnosis from diseases with which they may be confused.

Ophthalmology.—(Special subject). Monday, April 30, 1906. From 3 to 6 p.m.

(1) How would you diagnose gonorrhœal ophthalmia? Describe the course of the disease, its dangers, and the treatment you would pursue.

(2) Enumerate (without describing) the different possible manifestations of syphilis in the eyes and eyelids.

(3) Give the diagnosis, prognosis, and treatment of chronic glaucoma.

(4) What ocular conditions are liable to cause sympathetic ophthalmitis? Describe shortly the treatment of this affection, prophylactic and curative.

(5) Mention the different causes of epiphora. Describe the operative treatment of mucocele.

Laryngology and Rhinology.—(Special subject). Tuesday, May 1, 1906. Commencing 11 a.m.

(1) Describe the surgical anatomy and the chief relations of the sphenoidal sinus.

(2) Enumerate the causes, and give the differential diagnosis, of perforations of the nasal septum.

(3) Discuss the treatment of hæmorrhage, immediate and secondary, following tonsillotomy.

(4) Enumerate the lesions, outside the skull, which may cause paralysis of the left vocal cord.

(5) What complications may arise from a badly-constructed or unsuitable tracheotomy tube, after the operation has been successfully performed?

EXAMINATIONS.

Passed in Technical Subjects for the Rank of Lieutenant-Colonel. In the April, 1906, number of the Journal, page 84, Corps News, we omitted to note that Major W. Hallaran, M.B., obtained ·9 marks in selected subject.

Captain R. J. Blackham, R.A.M.C., who is a Member of the Middle Temple, passed the Final Examination for Call to the Bar, held by the Council of Legal Education in Gray's Inn Hall, London, on April 3, 4, 5 and 6.

THE LATE LIEUTENANT-COLONEL H. W. HUBBARD, R.A.M.C.

As several friends of the late Lieutenant-Colonel H. W. Hubbard have expressed heir wish that his memory should be preserved in some Institution connected with the Corps, enquiries have been made, and it has been ascertained that ample space still exists on the Tablets devoted to the names of the Officers of the Corps in St. George's Church at Aldershot for a suitable inscription; or a brass tablet could be placed in the Library of the Cambridge Hospital, of which he was in charge till shortly before his death. Officers desiring to subscribe are requested to communicate with Lieutenant-Colonel E. M. Wilson, C.B., C.M.G., D.S.O., R.A.M.C. (R.P.), "Belmont," Osborne Road, South Farnborough, and it is suggested that a small committee might be formed to carry out the wishes of the subscribers. The cost of either or both of the proposals mentioned would not be great, but of course any suggestions would be considered.

ROYAL SCHOOL FOR THE DAUGHTERS OF OFFICERS OF THE ARMY.

ELECTION, JUNE, 1906.

THE Director-General would be glad if officers, who may have a vote or votes at their disposal, in connection with the Royal School for the Daughters of Officers of the Army, would support the claims of :—

GERALDINE EVA PEARD (nine years of age, June 15, 1905), daughter of the late Lieutenant-Colonel H. J. Peard, C.M.G., R.A.M.C.

Lieutenant-Colonel Peard was a distinguished officer of our Corps, and after serving throughout the South African War he died at Middelburg, Cape Colony (after only three days' illness), from malignant scarlet fever, contracted in his attendance on cases of the disease.

NINA MARY PARSONS FELTHAM, aged 11, daughter of the late Major Feltham, who died of cholera, at Allahabad, in 1897, leaving a widow and two young children. Mrs. Feltham died in 1902, and the children are thus total orphans, and entirely dependant upon compassionate allowance.

Major Feltham served in the Royal Army Medical Corps nineteen years.

Officers may perhaps be able to render assistance in these cases by securing the support of any friends they may have among subscribers.

Communications in this matter should be addressed to The Manager, JOURNAL THE ROYAL ARMY MEDICAL CORPS, 68, Victoria Street, London, S.W.

SCHOLASTIC.

MRS. PEARD (widow of Lieutenant-Colonel H. J. Peard, C.M.G., R.A.M.C.) is opening a boarding house, in connection with a high-class school, at Surbiton (head mistress, Miss Procter, daughter of the late Major-General Montagu Procter, B.S.C.). Daughters of gentlemen only received. Home life and care combined with highest education. Apply to Head Mistress, 2, Surbiton Park Crescent, Kingston-on-Thames.

References kindly permitted to: Surgeon-General A. Keogh, C.B., Director-General, A.M.S.; Surgeon-General W. J. Fawcett, C.B., A.M.S.; Colonel D. Bruce, C.B., F.R.S., R.A.M.C.; Lieutenant-Colonel W. Babtie, V.C., C.M.G., R.A.M.C.; Lieutenant-Colonel B. Skinner, R.A.M.C.; Lieutenant-Colonel W. G. Macpherson, C.M.G., R.A.M.C.; Major T. McCulloch, R.A.M.C.

THE ROYAL ARMY MEDICAL CORPS FUND.

NOTICE OF FOURTH GENERAL MEETING.

THE Fourth General Meeting of Subscribers to this Fund will be held in the Theatre of the Royal United Service Institution on Monday, June 18, 1906, at 3 p.m. The Director-General will preside.

It is hoped that officers will freely express their views on any points connected with the Fund which they may wish discussed. Those officers who wish for information on any special point are asked to communicate with the Hon. Secretary, Lieutenant-Colonel Skinner, at 68, Victoria Street, S.W., in order that facts and figures may be furnished in response to any question asked.

AGENDA.

Lieutenant-Colonel A. B. Cottell has given notice that he will, seconded by Colonel A. T. Sloggett, move "That the R.A.M.C. resume its custom of inviting Corps guests to the Annual Dinner."

REGISTER FOR INDIAN SERVANTS.

FEW officers on going to India have not experienced the difficulty of getting good servants. The discomforts on arrival and of a long journey up country, unprovided with a bearer, or, what is worse, provided with a hastily selected man, taken haphazard from the crowd of indifferent or bad characters who congregate in Bombay, have fallen to the lot of most of us; whilst the period of trial and vexation, until a proper staff of servants is secured, is familiar to us all.

In our Corps, with regular annual reliefs, it should not be difficult to arrange for an interchange. Officers leaving India would then be able to provide places for the good and tried retainers they are relinquishing, and new arrivals would, by taking on these men, be spared many of the worries and troubles which now befall them. Further, good servants would not be lost to the Corps, and the prospects of continuous employment could not fail to have attraction for the better class of men.

With these ends in view, officers due home from India are requested to communicate to the Journal particulars of servants whom they can recommend, so that officers going out in relief may have an opportunity of securing these men. The particulars required are :—

(1) Class of servant.
(2) Whether for bachelor or married officer.
(3) District or station to which he belongs.
(4) Any special recommendations.

NOTE.—The date the officer leaves India should also be stated, and when and where the servant will be available.

ROYAL ARMY MEDICAL CORPS ANNUAL DINNER.

THE Annual Dinner of the Corps will take place on Monday, June 18, at the "Empire Hall," Trocadero Restaurant, Piccadilly Circus, W., at 8 o'clock precisely; the Director-General in the chair. Members intending to dine are requested to inform the Hon. Secretary as soon as possible, in order that the probable number attending may be known and that tickets may be sent.

All subscribers to the R.A.M.C. Fund, except any who may have expressly excluded the Annual Dinner in the allocation of their subscriptions, will be entitled to dine at subscribers' rates, provided that their subscriptions are credited to the R.A.M.C. Fund before the date of the dinner; also all officers who do not subscribe to the R.A.M.C. Fund but who still subscribe to the former R.A.M.C. Dinner Fund.

The price of the Dinner to subscribers will be 10s. The amount should be paid personally at the Hotel on the evening of the dinner.

The price to non-subscribers will be £1 12s. 6d., which must be sent by cheque or Post Office Order to the Hon. Secretary when applying for tickets. If the officer is unable to dine the money will be returned.

H. C. THURSTON, *Major, R.A.M.C.*,
Hon. Sec. Sub-Committee R.A.M.C. Dinner Fund.

66, *Scarsdale Villas, Kensington, W.*

ANNUAL CONGRESS OF THE ROYAL INSTITUTE OF PUBLIC HEALTH.

THE Administrative Medical Officer, Cork District, President of the Naval and Military Section of the Congress, is desirous that any Officer who may wish to join the Congress, to read papers or take part in the discussions, should communicate without delay with the Honorary Secretary, Naval and Military Section, Public Health Congress, District Health Laboratory, Victoria Barracks, Cork.

ROYAL ARMY MEDICAL CORPS BAND FUND.

THE question of the improvement of the Band, and the cost connected therewith, was committed for investigation to a Sub-Committee, consisting of Colonel H. E. R. James, Lieutenant-Colonel A. B. Cottell, Lieutenant-Colonel Sir James Clark, Bart., C.B., and Major G. St. C. Thom.

The suggestion to increase the band subscription for officers above the rank of Lieutenant by 2s. 6d. for every step in rank and increase of pay was put forward for consideration, and the result is as follows.

If the scale of increased subscription at 2s. 6d. increment for every step in rank were adopted, it would work out as follows:—

Director-General ..	..	..	..	£1	0 0
Surgeon-Generals ..	10, increase	15s. 0d.	..	7	10 0
Colonels ..	30,	,, 12s. 6d.	..	18	15 0
Lieutenant-Colonels (higher rate)	50,	,, 10s. 0d.	..	25	0 0
,, ,, ..	150,	,, 7s. 6d.	..	56	5 0
Majors ..	225,	,, 5s. 0d.	..	56	5 0
Captains ..	300, at	.. 2s. 6d.	..	37	10 0
				£202	5 0

The question next arose as to the manner in which the subscription thus increased could be best applied, and it appears that the increase in band income—as obtained by the adoption of the scale shown—would materially increase the efficiency of the band, being applied as follows:—

(1) *Purchase of Instruments.*—At present the band can only afford second-rate instruments, and many of the original ones which have been in use since the band's origin require to be replaced. An expenditure of £60 for two years at least, and £50 or so on an average for a period of four years, will be necessary to do what is wanted in this respect. (We now want a bombardon, £20; an oboe, £17; a new bassoon, £18, and several other instruments.) The cost of first-rate instruments is to those of second-rate as five to four. It will be an encouragement to the first instrument players to have good instruments, and the tone of the band will be much improved. As it is nearly all the violinists prefer to get and use their own instruments.

(2) *Purchase of Music.*—Economy has now to be exercised in this as in other respects. An increase in expenditure of about £20 per annum will enable the latest music to be bought.

(3) Improvement in the uniform of the band would increase its attractions to men to join and remain in it. It could be substantially improved at a cost of £45 for first year, £15 per annum for two years following, or renewal every fourth year.

(4) *Addition to Numbers.*—The band is now thirty-seven strong, and its increase to forty-five players would give a margin for casualties and further improve it; this could be done by adding three first class players at 6d. each, three seconds at 4d. each, and two third class players at 3d. each; 3s. a day band pay would be the increase in expenditure.

(5) The giving of a bonus to men on re-engagement would make the band additionally attractive, and at £3 per man would probably cost about £6 per annum.

It is not necessary or desirable to increase the rates of band pay, which are considered sufficient, and the men are satisfied. This amounts to £187, and as the band is now slightly exceeding its income in its expenditure, the sum of £202 5s. calculated to be the result of the increased subscription will not be found too much.

BIRTHS.

CARMICHAEL.—At Poonamallee, near Madras, on April 17, the wife of Lieutenant J. C. G. Carmichael, R.A.M.C., of a son.

CARMICHAEL.—At 76, Ahlone Road, Rangoon, on Sunday, March 25, 1906, the wife of D. Gordon Carmichael, M.B., Lieutenant R.A.M.C., of a daughter.

MORPHEW.—At 176, Maldon Road, Colchester, on May 15, the wife of Major E. M. Morphew, R.A.M.C., of a daughter.

DEATHS.

DAVIES.—On January 13, at Sierra Leone, Surgeon-Major William Broughton Davies, M.D., retired Army Medical Department, in his 73rd year. He entered the Service September 5, 1859, and was seconded May 5, 1870, for service as Assistant Colonial Surgeon for British Sherbro. He was promoted Surgeon (remaining on Seconded List) March 1, 1873; and Surgeon-Major, April 1, 1875. He resumed military duty (from Seconded List) November 16, 1875, and retired September 27, 1881.

GOGARTY.—On April 18, at Canterbury, Surgeon-Major Henry Alexander Gogarty, M.D., retired Medical Department, in his 73rd year. He entered the Service August 29, 1855; was promoted Surgeon February 26, 1870; and Surgeon-Major March 1, 1873. He retired February 21, 1877.

EXCHANGES.

The charge for inserting Notices respecting Exchanges in the Royal Army Medical Corps, is 5/- for not more than five lines, which should be forwarded by Cheque or P.O.O., with the notice, to Messrs. G. STREET and CO., Ltd., 8, *Serle Street, London, W.C., not later than the* 22*nd of the month.*

NOTICE TO SUBSCRIBERS.

Officers are particularly requested to give timely notice of changes of station or changes of address, in order to ensure the posting of the Journal to its correct destination.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, &c. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts and commands at home and abroad. All these communications should be written upon one side of the paper only, they should by preference be typewritten, but, if not, all proper names should be written in capital letters (or printed) to avoid mistakes, and be addressed to The Editor, Journal of the Royal Army Medical Corps, 68, Victoria Street, London, S.W.

Letters regarding subscriptions, non-delivery of the Journal, or change of address, should be sent to The Manager, Journal of the Royal Army Medical Corps, 68, Victoria Street, London, S.W.

It is requested that all cheques or postal orders for subscription to the Journal, Corps News, Reprints, &c., be made payable to the "Manager, Journal R.A.M.C.," and not to any individual personally.

Communications have been received from Surgeon-General G. J. H. Evatt, C.B., A.M.S.(R.); Majors C. W. R. Healey, W. L. Gray, E. Eckersley, J. V. Salvage, E. McK. Williams, F. M. Mangin, C. B. Lawson, F. Smith, D.S.O.; Captains H. Ensor, C. H. Straton, John Tobin; Captains W. W. Jendwine, E. D. W. Grieg, I.M.S.; Lieutenants L. Bousfield, D. G. Carmichael; G. Lenthal Cheatle, C.B., F.R.C.S.Eng.

In the event of reprints of articles being required by the authors, notification of such must be sent when submitting the papers. Reprints may be obtained at the following rates, and other reprints at proportionate rates:—

Number of Reprints	Number of Pages	Cost			Extra for Covers							
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		£	s	d.	s.	d.	s.	d.	s.	d.	s.	d.
	4	0	2	6								
12	8	0	4	6	3	6	0	11	3	2	0	7
	16	0	7	6								
	4	0	3	0								
25	8	0	5	6	4	0	1	3	3	6	0	9
	16	0	9	6								
	4	0	4	0								
50	8	0	6	9	5	0	1	9	4	0	1	0
	16	0	12	0								
	4	0	5	6								
100	8	0	9	0	6	6	3	3	5	6	2	0
	16	0	16	9								
	4	0	8	6								
200	8	0	13	6	9	0	6	3	7	6	4	0
	16	1	3	6								

The following periodicals have been received: *The Medical Record, The Medical News, New York Medical Journal, American Medicine, Gazette Med. de Paris, Archives de Medicine et de Pharmacie Militaires, Il Morgagni, Gazetta Medico-Italiana, The Medical Review, El Siglo Medico, Der Militärärzt, Deutsche Militärärztliche Zeitschrift, Anales de Sanidad Militar, Revue Med. de la Suisse Romande, La Medicina Militar Espanola, The Boston Medical and Surgical Journal, Annali di Med. Navale, Giornale del Regio Esercito, Le Caducée, The Hospital, The Ophthalmoscope, St. Thomas's Hospital Gazette, Bulletin de l'Acad. de Med. de Paris, Arch. Med. Belges, Voyenno Medisinskii, The Indian Medical Gazette, The Australasian Medical Gazette, Journal of the Association of Military Surgeons, U.S., Militärlagen ungwet af Militärlaegeforeningen, i Kjobenharn, The Veterinary Journal, The Practitioner, Public Health, Medical Review, The Army and Navy Gazette, The United Service Gazette, Journal of the Royal United Service Institution, The Johns Hopkins Press, The Health Resort and Journal of Spas and Sanatoria, Journal of the Royal Sanitary Institute, Journal of the U.S. Institution of India, Indian Public Health, Bulletin de l'Institut Pasteur, Records of the School of Medicine, Cairo, The Philippine Journal of Science, Bulletins and Reports of the Bureau of Animal Industry, U.S. Dept. of Agriculture, Journal of Tropical Veterinary Science.*

NOTICE.

The Corps News is now printed as an inset to the Journal and separate copies may be subscribed for, price 2d. monthly.

Distribution List of Officers

OF THE

ARMY MEDICAL STAFF

AND

ROYAL ARMY MEDICAL CORPS.

JANUARY, 1906.

[This List is prepared according to the latest information received. Officers are invited to communicate any particulars regarding alterations, errors, or omissions, to Major T. McCULLOCH, R.A.M.C., 68, Victoria Street, S.W.]

SPECIALIST CERTIFICATES IN:

a = State Medicine (R.A.M. College qualification).
b = Diploma in Public Health.
c = Bacteriology.
d = Dental Surgery.
e = Dermatology and Venereal Diseases.
f = Specific Fevers.
g = Laryngology.
h = Midwifery and Gynæcology.
j = Operative Surgery.
k = Ophthalmology.
l = Otology.
m = Pædiatrics.
n = Psychological Medicine.
o = Skiagraphy.
p = Tropical Medicine.

ARMY MEDICAL SERVICE.

HEADQUARTER STAFF.

Rank.	Name.	Appointment.
Surgeon-General ..	Keogh, A., M.D., C.B.	Director-General of Army Med. Services.
,, ,, ..	Fawcett, W. J., M.B., C.B. ..	Deputy Director-General.
Lieutenant-Colonel .	Babtie, W., M.B., V.C., C.M.G...	Assistant Director-General.
Major	McCulloch, T., M.B.	Deputy Assistant Director-General.
Lieutenant-Colonel .	Russell, M. W.	,, ,, ,, ,,
Major	Thurston, H. C., C.M.G... ..	,, ,, ,, ,,

ARMY MEDICAL SERVICE ADVISORY BOARD.

Rank.	Name.	Appointment.
Brevet-Colonel ..	Bruce, D., F.R.S., M.B., C.B. ..	Expert in Tropical Diseases.
Lieutenant-Colonel .	Davies, A. M.	Expert in Sanitation.
,, ,,	Skinner, B. M.	Secretary.

ROYAL ARMY MEDICAL COLLEGE.

Rank.	Name.	Appointment.
Colonel (*temporary*) .	James, H. E. R.	Commandant and Director of Studies.
Major	Spencer, C. G., M.B., F.R.C.S. Eng.	Prof. of Clinical and Military Surgery.
Lieutenant-Colonel .	Simpson, R. J. S., M.B., C.M.G.	,, Tropical Medicine.
,, ,, .	Firth, R. H.	Professor of Military Hygiene.
Major (Brevet-Lieutenant-Colonel)	Leishman, W. B., M.B.	,, Pathology.
Major	Fowler, C. E. P.	Assistant Professor of Military Hygiene.
Captain	Harvey, D., M.B.	,, ,, Pathology

SURGEON-GENERALS.

Name.	Station.	Appointment.
Charlton, W. J.	London	Principal Med. Officer, Eastern Command, England.
Donovan, W., C.B. ..	Pretoria	,, ,, ,, South Africa.
Edge, J. D., M.D., C.B...	Dublin	,, ,, ,, Irish Command.
Fawcett, W. J., M.B., C.B.	War Office, London ..	Headquarter Staff.
Gallwey, Sir T. J., M.D., K.C.M.G., C.B.	Simla, India	Principal Med. Officer, His Majesty's Forces in India.
Gubbins, W. L., M.B., C.B., M.V.O.	Naini Tal, India ..	,, ,, ,, Eastern Command, India.
McNamara, W. H., M.D., C.B., C.M.G.	Aldershot	,, ,, ,, Aldershot Command.
Quill, R. H., M.B. ..	Netley	,, ,, ,, Netley.

COLONELS.

Name.	Station.	Appointment.
Barrow, H. J. W...	Mian Mir, India	Principal Medical Officer, 3rd Lahore Div.
Blennerhassett, B. M., C.M.G.	Murree, India	On leave.
Bourke, G. D.	Devonport	Administrative Medical Officer, Devonport District.
Chester, W. L., M.B.	Peshawar, India	Principal Med. Officer, 1st Peshawar Div.
Dorman, J.C.,M.B.,C.M.G.	Cape Town, S. Africa	Principal Medical Officer, Cape Colony.
Ellis, P. M.	Curragh	Administrative Med. Officer, Dublin Dist.
Fenn, E. H., C.I.E.	Chatham	,, ,, ,, Chatham.
Kenny, W. W., M.B.	Pretoria	Principal Med. Officer, Transvaal District.
Leake, G. D. N.	Naini Tal, India	,, ,, ,, Lucknow Division.
Lloyd, O. E. P., V.C.	Dover	Administrative Medical Officer, Dover.
McNamara, J., M.D.	Gibraltar	Principal Medical Officer, Gibraltar.
May, W. A., C.B...	Tidworth	Admin. Medical Officer, Tidworth Dist.
Morris, J. J., M.D.	Portsmouth	,, ,, ,, Portsmouth ,,
Magill, J., M.D., C.B.	Cairo	Principal Medical Officer, H.M. British Troops, Egypt.
Mac Neece, J. G.	Malta	Principal Med. Officer, Malta Command.
O'Connell, M. D., M.D.	York	,, ,, ,, Northern ,,
Pratt, W. S., M.B.	Mhow, India	,, ,, ,, 5th Division.
Rainsford, W. J. R., C.I.E.	Bermuda	.. ..
Routh, J. I.	Bombay, India	.. ..
Saunders, W. E., C.B.	Mussoorie, India	Principal Med. Officer, Meerut Division.
Slaughter, W. B.	Colchester	Administrative Med. Officer, Colchester.
Sloggett, A. T., C.M.G.	London	Principal Medical Officer, London Dist.
Trevor, F. W., M.B.	Poona, India	,, ,, ,, 6th Div., and Off. Prin. Med. Officer, Western Com.
Williamson, J. F., M.B., C.B., C.M.G.	Jubbulpore, India	Principal Medical Officer, Jubbulpore and Jhansi Brigades.
Whitehead, H. R.	Sialkot, India	Principal Medical Officer, Sialkot and Abbottabad Brigades.

LIEUTENANT-COLONELS.

(Under Article 365 of the Royal Warrant.)

Name.	Station.	Appointment.	Specialist Certificates in
Anderson, L. E.	Aldershot	Offi. in charge Cambridge Hosp.	—
Allport, H. K., M.D.	Bulford	Offi. in charge Military Hosp. and Comdg. 20th Coy. R.A.M.C.	— —
Babtie, W., M.B., V.C., C.M.G.	War Office, London	Headquarter Staff	—
Bruce, D., F.R.S., M.B., C.B. (Brevet-Colonel)	London	Expert in Tropical Diseases, Army Medical Service Advisory Board	—
Bedford, W. G. A., M.B., C.M.G.	Gibraltar	Officer in charge Military Hospital	—
Baker, W. J.	Dublin	Officer in charge Military Hospital, Arbour Hill	—
Corker, T. M., M.D.	Belfast	Administrative Medical Officer Belfast District	—
Croly, A. E. J.	Edinburgh	Officer in charge Mil. Hosp., and Officer Com. 13th Coy. R.A.M.C.	—
Coutts, G., M.B.	Salisbury	Assistant to Principal Medical Officer, Southern Command	—
Dodd, J. R., M.B.	Mhow, India	Officer in charge Military Hospital	b.
Emerson, I. B.	York	,, ,, ,, ,,	—

Name.	Station.	Appointment.	Specialist Certificates in
Forman, R. H., M.B. ..	Woolwich	Admin. Medical Officer and Officer in charge Royal Herbert Hosp.	—
Ford, R. W., D.S.O. ..	Royal Hospital, Chelsea	Deputy Surgeon	—
Goggin, G. T.	Belfast	Officer in charge Mil. Hosp., and Com. 15th Coy. R.A.M.C.	—
Hodson, R. D.	Returning to England, tour expired		—
Harwood, J. G.	Portsmouth	Officer in charge Mil. Hosp., and Commanding 6th Coy. R.A.M.C.	—
Heffernan, W.	Wynberg, S. Africa ..	Officer in charge Military Hospital	—
Hathaway, H. G. ..	Bombay, India	Officiating Principal Med. Officer, Bombay Brigade	—
Inman, A. W. P., M.B. ..	Meerut, India	.. ..	—
Johnston, P. H., M.D., C.M.G.	Jamaica	Senior Medical Officer and Officer Commanding R.A.M.C.	—
Johnston, W. T., M.D. ..	Canterbury	Officer in charge Military Hospital	—
Jones, J. M.	Devonport	Officer in charge Mil. Hosp., and Officer Com. 7th Coy. R.A.M.C.	—
Jennings, R., M.D. ..	Valetta, Malta	Officer in charge Military Hosp.	—
Kirkpatrick, H. C., M.D.	.. ..	.. ..	—
Kerin, M. W.	Peshawar, India	Officer in charge Military Hosp. and Principal Medical Officer Khyber Movable Column	—
Love, R. L., M.D... ..	Fermoy	Officer in charge Military Hospital	—
Martin, H., M.B... ..	Shorncliffe..	,, ,, ,, ,,	—
MacNeece, T. F.	Cork	Officer in charge Mil. Hosp. and Com. 16th Coy. R.A.M.C.	—
Maclean, F. B.	Woolwich	Officer in charge Auxiliary Hosp.	—
Macnamara, W. J., M.D.	Bloemfontein, S. Africa ..	Principal Medical Officer, Orange River Colony and Natal	—
Milward, E. O.	Southampton	Embarkation Medical Officer ..	—
Murray, H. W., M.B. ..	Shorncliffe	.. ..	—
Maunsell, E. L.	Gosport	Officer in charge Military Hospital	—
Mosse, C. G. D.	Winchester	,, ,, ,, ,,	—
Moberley, H. J. R. ..	Aldershot	Officer in charge Connaught Hosp.	—
North, E.	Returning to England, tour expired		—
O'Connor, A. P., C.B. ..	Bordon	.. ..	—
O'Sullivan, D.	Rawalpindi, India ..	.. ..	—
Peterkin, A., M.B. ..	Mauritius	Senior Medical Officer	—
Roche, E. A.	Chatham	Officer in charge Mil. Hosp. and Officer Com. 10th Coy. R.A.M.C.	—
Robinson, G. W.	Aldershot	.. ..	—
Robinson, S. C. B. ..	Colchester	Officer in charge Mil. Hosp. and Officer Com. 9th Coy. R.A.M.C.	—
Seymour, C., M.B. ..	Royal Hospital, Chelsea..	Physician and Surgeon	—
Sylvester, G. H.	Ceylon	Senior Medical Officer	—
Todd, O., M.B.	Cairo, Egypt	Officer in charge Military Hosp. and Military Prison	—
Twiss, G. E.	Netley	Registrar and Secretary and Officer Commanding 4th, 5th, and 21st Coys. R.A.M.C.	—
Webb, C. A.	Dover	Officer in charge Military Hospital	b.
Wardrop, D., M.B. ..	Netley	In charge Medical Division ..	—
Woods, C. R., M.D. ..	Dublin	Officer in charge Roy. Infirm. and Officer Com. 14th Coy. R.A.M.C.	b.

LIEUTENANT-COLONELS.

Adams, G. G.	Returning to England, tour expired		—
Allen, S. G.	Ambala, India	.. ..	—
Battersby, H. L.	Ranikhet, India	Officer in charge Military Hospital	—

Name.	Station.	Appointment.	Specialist Certificates in
Butt, E.	Dublin	Medical Inspector of Recruits, Irish Command	—
Battersby, J., M.B. ..	Chester	Medical Inspector of Recruits, Welsh and Midland Command	—
Birrell, W. G., M.B. ..	Edinburgh	Medical Inspector of Recruits, Scottish Command	—
Brazier-Creagh, G. W., C.M.G.	Fyzabad, India	Officer in charge Military Hospital	—
Barratt, H. J.	Agra, India	Officer in charge Military Hospital	b.
Burton, F. H. M., M.D...	Standerton, S. Africa ..	,, ,, ,, ,,	—
Bartlett, C. R.	West African leave ..	.. ..	—
Brooke-Pechell, Sir A. A., Bt., M.B.	Portsmouth	.. ..	—
Bond, R. P.	Aldershot	.. ..	—
Braddell, M. O'D., M.B.	Woolwich	Registrar and Secretary Royal Herbert Hospital, and Officer Com. 12th Coy. R.A.M.C.	—
Beevor, W. C., M.B., C.M.G.	Karachi, India	Officer in charge Military Hospital	—
Birt, C.	Millbank, London ..	Clinical Pathologist	—
Berryman, W. E... ..	India	.. ..	—
Blackwell, C. T., M.D. ..	Hyderabad	.. ..	b.
Culling, J. C.	Pembroke Dock	Officer in charge Military Hospital	—
Carmichael, J.	Northern Command, India	.. ..	—
Caldwell, R.	Sheffield	Officer in charge Military Hospital	b.
Cree, G.	India	.. ..	—
Curtis, J. H.	Ballincollig	Officer in charge Military Hospital	—
Carr, H., M.D.	Mount Abu, India ..	Officer in charge Mil. Hosp. and Laurence School, Civil Surgeon	—
Cree, H. E.	Guildford	Officer in charge Military Hospital	—
Dugdale, W.	Potchefstroom, S. Africa	Senior Medical Officer and Officer in charge Military Hospital	—
Daly, F. A. B., M.B., C.B.	Curragh	Officer in charge Military Hospital and Officer Commanding 17th Coy. R.A.M.C.	—
Davies, A. M.	London	Expert in Sanitation, Army Medical Service Advisory Board	b.
Dundon, M.	Devonport	Anæsthetist	—
Dick, W.	Returning to England, tour expired	.. ..	b.
Dodd, A.	Chester	Officer in charge Military Hospital	—
Donnet, J. J. C.	Quetta, India	.. ..	—
Duncan, S. E.	Birmingham	Officer in charge Military Hospital	—
Davis, E.	Ambala, India	.. ..	—
Day, W. B., M.B. ..	Devonport	.. ..	—
Daly, J. H.	Queenstown	.. ..	—
Daly, T.	Poonamallee	Officer in charge Military Hospital	—
Flanagan, J. W. H. ..	Lichfield	,, ,, ,, ,,	—
Franklin, D. F.	Chakrata, India	,, ,, ,, ,,	b.
Firth, R. H.	R.A.M. College, London..	Professor of Military Hygiene ..	b.
Faunce, C. E.	Colaba, India	Officer in charge Military Hospital	—
Freyer, S. F., M.B., C.M.G.	Netley	.. ..	—
Forrest, J. R.	Ahmedabad, India ..	Officer in charge Military Hospital and Cantonment Hospital	b.
Fletcher, H. J., M.B. ..	Shoeburyness	Officer in charge Military Hospital and Recruiting	—
Ferguson, N. C., M.B., C.M.G.	Middelburg, Cape Colony	Officer in charge Military Hospital	b.
Geoghegan, A. O., M.D...	Bury	,, ,, ,, ,,	—
Gibson, J., M.B.	Limerick	,, ,, ,, ,,	—
Geddes, R. J., M.B., D.S.O.	Aldershot	.. ..	b.
Gubbin, G. F.	Dover	.. ..	b.
Green, J. S., M.B. ..	Dublin	Officer in charge Military Hospital, Richmond	—
Gordon, P. C. H... ..	Bangalore, India	Officer in charge Military Hospital	—

Name.	Station.	Appointment.	Specialist Certificates in
Hall, J. L...	Quetta, India	.. ..	—
Hetherington, R. P., M.D.	Dublin	Officer in charge Military Hospital, Portobello	—
Hubbard, H. W.	London	Recruiting Duties	—
Hackett, R. I. D.	Harrismith, S. Africa	Senior Medical Officer and Officer in charge Military Hospital	—
Haslett, J. C., M.D.	Allahabad, India	Officer in charge Military Hospital	—
Hamilton, T. W. O'. H., M.B., C.M.G.	Shorncliffe	Anæsthetist	—
Houston, F. S., C.M.G.	Royal Hosp., Kilmainham	Physician and Surgeon	—
Hunter, G. D., D.S.O.	Egypt	Principal Medical Officer Egyptian Army	—
Henderson, R. S. F., M.B.	Kamptee, India	Officer in charge Military Hospital	—
Haines, H. A., M.D.	Dalhousie, India	,, ,, ,, ,,	—
Hale, G. E., D.S.O.	Poona, India	,, ,, ,, ,,	—
Hickson, S., M.B.	S. Africa	.. ..	—
Hearn, M. L.	North China	Senior Medical Officer	—
Hall, R. H., M.D.	Cork	Company Officer and Anæsthetist	—
Hanley, R. G., M.B.	Rawalpindi, India	.. ..	—
Irvine, D. L.	Aldershot	In charge Cavalry Brigade	—
Irwin, J. M., M.B.	,,	Staff Officer to Principal Medical Officer, Aldershot Army Corps	—
Johnston, H. H., M.D., C.B.	Straits Settlements	Senior Medical Officer	b.
Jencken, F. J., M.B.	Deolali, India	Officer in charge Military Hospital	b.
James, H. E. R. (temporary Colonel)	R.A.M. College, London	Commandant and Director of Studies	b.
Johnson, C. W., M.B.	Eastern Command	.. ..	—
Jones, F. W. C., M.B.	Nasirabad, India	Officer in charge Military Hospital	—
Josling, C. L.	Victoria, S. China	,, ,, ,, ,,	—
Kay, A. G., M.B...	Netley	Officer in charge Insane Wards	—
Kirkpatrick, R., M.D., C.M.G.	Jullundur, India	Officer in charge Military Hospital	—
Lucas, T. J. R., M.B.	Aldershot	Officer Commanding Depôt and Training School R.A.M.C., and R.A.M.C. Records	—
Lane, A. V.	Glasgow	In charge Recruiting Duties	—
Lambkin, F. J.	Rochester Row, London	Officer in charge Military Hospital	—
Lougheed, S. F., M.D., C.M.G.	Royal Arsenal, Woolwich	Senior Medical Officer	—
Lynden-Bell, E. H. L., M.B.	Lucknow, India	.. ..	—
Lilly, A. T. I.	Canterbury	Officer in charge Women and Children and Recruiting	—
Lane, C. A., M.B.	Colombo, Ceylon	Officer in charge Military Hospital	-
McCreery, B. T., M.B.	Secunderabad Div., India	.. ..	b.
Morse, R. E. R.	Cawnpore, India	Officer in charge Military Hospital	—
Magrath, C. W. S., M.D.	Hilsea	,, ,, ,, ,,	—
Morris, W. A.	Sialkot, India	,, ,, ,, ,,	—
McGill, H. S.	Gravesend	In charge Military Hospital and Recruiting	b.
Macpherson, W. G., M.B., C.M.G.	War Office, London	.. ..	b.
Moore, R. R. H., M.D.	Aldershot	In charge Isolation Hospital	—
Maher, J.	Sandhurst	Surgeon R.M.C.	—
Manders, N.	Curepipe, Mauritius	Officer in charge Military Hospital	—
Meek, J., M.D.	Tower of London	,, ,, ,, ,,	b.
Morris, A. E., M.D.	Western Command, India	.. ..	—
Molesworth, R. E.	Ranikhet, India	.. ..	—
Macleod, R. L. R., M.B.	Dublin	Sanitary Officer, Dublin and Belfast District	b.
Noding, T. E.	Maritzburg	Senior Medical Officer, Natal, and Officer in charge Military Hosp.	—

Name.	Station.	Appointment.	Specialist Certificates in
Nichols, F. P., M.B. ..	Norwich	Officer in charge Military Hospital	—
Nichol, C. E., M.B., D.S.O.	Jubbulpore, India ..	,, ,, ,, ,,	—
Nicolls, J. M., M.B. ..	Forrest, Malta	,, ,, ,, ,,	—
Nash, L. T. M.	Golden Hill	,, ,, ,, ,,	—
O'Keefe, M. W., M.D. ..	Woolwich	Officer in charge Medical Division	—
O'Donnell, T. J., D.S.O.	Quetta, India	Officer in charge Military Hospital	—
O'Brien, R. F.	Sheerness	.. ..	—
O'Connell, D. V., M.D. ..	Gibraltar	In charge Staff and Departments and Garrison Dispensary	b.
O'Halloran, M., M.D. ..	Middelburg, Transvaal ..	Officer in charge Military Hospital	—
Porter, R., M.B.	Bloemfontein, S. Africa ..	.. ..	—
Pike, W. W., D.S.O. ..	Mandalay, India	Officer in charge Military Hospital and Cantonment Hospital	—
Powell, S., M.D. ..	Aldershot	Officer in charge Louise Margaret Hospital	—
Philson, S. C.	Roorkee, India	Officer in charge Military Hospital	—
Pinches, W. H.	Brighton	,, ,, ,, ,,	—
Rhodes, J. H. A.	Valetta, Malta	.. ..	—
Rowney, W., M.D. ..	Bareilly, India	Officer in charge Military Hospital	—
Rose, A. S., M.D. ..	Meerut, India	,, ,, ,, ,,	—
Risk, E. J. E.	Bloemfontein, S. Africa ..	,, ,, ,, ,,	—
Reade, W. L.	Weedon	Officer in charge Military Hospital	—
Russell, A. F., M.B., C.M.G.	London	Medical Inspector of Recruits, Eastern Command	—
Reckitt, J. D. T.	Multan, India	Officer in charge Military Hospital	—
Reid, J. M., M.D. ..	Salisbury	Medical Inspector of Recruits, Southern Command	—
Russell, M. W.	War Office, London ..	Headquarter Staff	—
Reilly, C. C.	Murree, India	Officer in charge Military Hospital	—
Rowan, H. D., M.B. ..	Dalhousie, India ..	Staff Surgeon	—
Swabey, L. W.	Calcutta, India	Officer in charge Military Hospital	—
Sawyer, R. H. S., M.B. ..	Pretoria, S. Africa ..	Senior Medical Officer and Officer in charge Military Hospital	—
Skinner, B. M.	London	Secretary, Army Medical Service Advisory Board	—
Simpson, R. J. S., M.B., C.M.G.	R.A.M. College, London ..	Professor of Tropical Medicine ..	—
Stuart, J. R., M.B. ..	Fort George	Officer in charge Military Hospital	—
Sloggett, H. M.	Cottonera, Malta	.. ..	—
Swan, W. T., M.B. ..	Jullundur, India	.. ..	—
Shine, J. M. F., M.D. ..	Western Command, India	.. ..	—
Sparkes, C. S.	Kowloon, S. China ..	Officer in charge Military Hospital	—
Sexton, M. J., M.D. ..	Muttra, India	,, ,, ,, ,,	—
Starr, W. H. ..	Secunderabad, India ..	.. ..	—
Sutton, A. A., D.S.O. ..	Tower Hill, W. Africa ..	Senior Medical Officer and Officer in charge Military Hospital	—
Townsend, S., M.D. ..	Wellington, India ..	Officer in charge Military Hospital	—
Thiele, C. W., M.B. ..	Secunderabad Divn., India	.. ..	—
Treherne, F. H.	Nowshera, India	Officer in charge Military Hospital	b.
Trevor, H. O.	Aldershot	Medical Inspector of Recruits for Aldershot Army Corps	—
Tyrrell, C. R.	London	Staff Officer to Principal Medical Officer, Eastern Command	—
Thomson, W. B.	Portsmouth	In charge Military Families' Hosp.	—
Tate, A. E.	Simla, India	Staff Surgeon in charge Army Hd.-qr. Staff and Establishment	—
Thompson, H. N., M.B., D.S.O.	Woking	Officer in charge Military Hospital	—
Turner, W.	Kasauli, India	Officer in charge Military Hospital and Civil Surgeon	—
White, H. L. E.	Woolwich	.. ..	—
Woodhouse, T. P. ..	Ambala, India	Officer in charge Military Hospital	—

Name.	Station.	Appointment.	Specialist Certificates in
Weston, G. E.	Prospect, Bermuda ..	Acting Principal Medical Officer and Officer in charge Military Hospital	—
Wight, E. O.	Hounslow	Officer in charge Military Hospital and Recruiting	b.
Westcott, S., C.M.G. ..	York	Medical Inspector of Recruits, Northern Command	b.
Wyatt, H. J.	Curragh	Officer in charge Military Hospital	—
Wilson, G., M.B.	Ferozepore, India ..	.. ..	—
Winter, T. B.	Eastern Command, India	.. ..	—
Wills, S. R.	Belfast	.. ..	—
Yourdi, J. R., M.B. ..	Secunderabad, India ..	Officer in charge Military Hospital	—

MAJORS.

Adamson, H. M., M.B. ..	Shahjahanpur, India ..	Officer in charge Military Hospital	—
Aldridge, A. R., M.B. ..	Returning to England, tour expired	.. ..	b.
Austin, H. W.	Quetta, India	.. ..	—
Allport, C. W., M.D. ..	Fort Allahabad, India ..	Officer in charge Military Hospital	—
Alexander, G. F., M.B. ..	Harrismith, S. Africa ..	Company Officer	—
Austin, J. H. E.	Returning to England, tour expired	.. ..	—
Anderson, E. C., D.S.O...	Shorncliffe	.. ..	—
Alexander, J. D., M.B. ..	Cahir	Officer in charge Military Hospital	—
Austin, R. F. E.	Chatham	Anæsthetist	—
Anderson, J. B.	Meerut, India	In charge Divisional Laboratory	c.
Black, J. G., M.D. ..	Returning to England, tour expired	.. ..	—
Buchanan, J. B. W., M.B.	Darjeeling, India	.. ..	—
Brown, H. H., M.B. ..	Sheffield	.. ..	—
Burtchaell, C. H., M.B...	Dublin	.. ..	—
Bent, G.	Lucknow, India	.. ..	—
Barefoot, G. H.	On sick leave	.. ..	—
Browning, T.	Buttevant	Officer in charge Military Hospital	—
Buist, R. N., M.B. ..	Sialkot, India	.. ..	—
Burnside, E. A.	Jullundur, India	.. ..	—
Browne, E. G.	Dublin	.. ..	—
Bullen, J. W., M.D. ..	Mullingar	Officer in charge Military Hospital	—
Bate, A. L. F.	Neemuch, India	Officer in charge Military Hospital, Station Staff and Agency Surgn.	—
Blenkinsop, A. P. ..	Lucknow, India	.. ..	—
Borradaile, A. L., M.B. ..	Brecon	Officer in charge Military Hospital	—
Birt, T.	Chatham	Officer in charge Casualty Hospital and Recruiting	—
Beach, T. B.	Chatham	Company Officer	—
Bewley, A. W.	Dublin	.. ..	—
Beveridge, W. W. O., M.B., D.S.O.	London	Medical Officer, Royal Army Clothing Department	b.
Bray, G. A. T.	Meerut, India	.. ..	—
Buist, H. J. M., M.B., D.S.O.	Pretoria, S. Africa ..	Staff Officer to Principal Medical Officer, S. Africa	—
Brogden, J. E.	N. China	.. ..	—
Begbie, F. W.	Millbank, London ..	Registrar and Secretary Coy. Officer	—
Beyts, W. G.	Solon, India	Officer in charge Military and Cantonment Hospital	—
Buchanan, G. J., M.B. ..	Bareilly, India	In charge Brigade Laboratory and Cantonment Hospital	—
Bray, H. A.	Attached Egyptian Army	.. ..	—
Buswell, F. R.	Belgaum, India	.. ..	—
Berryman, H. A.	Gibraltar	Company Officer	o.
Barnett, K. B., M.B. ..	N. China	.. ..	m.

Name.	Station.	Appointment.	Specialist Certificates in
Cocks, H., M.B.	Madras, India	Officer in charge Military Hospital and H.E. the Governor's Body Guard	—
Corkery, T. H.	Devonport	.. ..	—
Clarkson, T. H. F. ..	Jersey	Officer in charge Military Hospital, Fort Regent	—
Cottell, R. J. C.	Woolwich	Officer in charge Military Families' Hospital	h.
Cummins, H. A., M.D., C.M.G.	Bara Gali, India	Officer in charge Military Hospital	b.
Clark, S. F., M.B. ..	Wynberg, S. Africa ..	Sanitary Officer, Cape Colony ..	b.
Copeland, R. J., M.B. ..	Portsmouth	Company Officer	—
Connor, J. C., M.B. ..	Portsmouth	.. ..	—
Crawford. G. S.	Aldershot	Officer in charge 4th Brigade ..	b.
Condon, E. H., M.B. ..	Sabathu, India	Officer in charge Military Hospital	—
Chambers, A. J.	Netley	Officer in charge Staff and Families	—
Collins, D. J., M.B. ..	Pretoria, S. Africa ..	.. ..	k. b.
Clark, E. S., M.B. ..	Peshawar, India	.. ..	f.
Cameron, K. M., M.B. ..	Kasauli, India	Officer in charge Cantnt. Hosp. ..	j.
Durant, R. J. A... ..	Dum Dum, India.. ..	Officer in charge Military Hospital, Ammunition Factory, Cossipore and Dukinsore Factories, and Cantonment Outdoor Dispens.	—
Davidson, J. S., M.B. ..	Parkhurst	Officer in charge Military Hospital	—
Donegan, J. F.	Cairo, Egypt	Officer in charge Military Hospital, Kasr-el-Nil, in charge G.O.C. and Staff and Depts., Cairo, Acting on Civil Consulting Staff of Anglo-American Hospl., Cairo	—
Donaldson, J.	Agra, India	.. ..	—
Dowman, W. S.	Cawnpore, India	.. ..	—
Davoren, V. H. W. ..	Devonport	.. ..	—
Dalton, C.	Gharial, India	Officer in charge Military Hospital	—
Duggan, C. W., M.B. ..	Lucknow, India	.. ..	—
Dunn, H. N., M.B. ..	Royal Arsenal, Woolwich	.. ..	—
Dansey-Browning, G. ..	Attached Egyptian Army	.. ..	b.
Elkington, H. P. G. ..	Aldershot	Sanitary Officer, Aldershot Army Corps	b.
Eckersley, E., M.B. ..	Eastern Command, India	.. ..	—
Edye, J. S.	Ambala, India	Plague Health Officer	—
Elliott, C. R., M.D. ..	Returning to England, tour	expired	b.
Erskine, W. D., M.B. ..	Cairo, Egypt	.. ..	—
Fallon, J.	Dagshai, India	Officer in charge Military Hospital	—
Fayrer, J., M.D.	Duke of York's School ..	Officer in Medical charge ..	—
Freeman, E. C.	Colchester	Sanitary Officer, Northern Area, Eastern Command	b.
Forde, B., M.B.	Middelburg, Transvaal ..	In charge Women and Children's Hospital and Anæsthetist	—
Ferguson, J. D., D.S.O...	Aldershot	Second in Command and Instructor, Depôt R.A.M.C.	—
Faichnie, N., M.B. ..	York	Sanitary Offi., Northern Command	b.
Fleming, C. C., M.B., D.S.O.	Malta	.. ..	—
Faichnie, F. G.	Pachmarhi, India ..	In charge Military Hospital and Cantonment Hospital	—
Fowler, C. E. P.	R.A.M. College, London..	Assistant Professor of Military Hygiene	k. b.
French, H. C.	Woolwich	Specialist in Dermatalogy ..	e. b.
Fleury, C. M.	Gozo, Malta	Officer in charge Military Hospital	o.
Fox, A. C...	Bulford	.. ..	h.
Gerrard, J. J., M.B. ..	Brighton	.. ..	—
Garner, C., M.B... ..	Egyptian Sanitary Department	.. ..	—

Name.	Station.	Appointment.	Specialist Certificates in
Gray, W. L., M.B. ..	Valetta, Malta	Sanitary Officer	b.
Girvin, J.	London	In charge St. George's Barracks..	—
Graham, W. A. S. J. ..	Chatham	.. ..	—
Gibbard, T. W., M.B. ..	Northern Command, India	.. ..	k.
Goodwin, T. H. J. C., D.S.O.	Woolwich	Officer in charge Cadet Hospital, Royal Military Academy	j. o.
Green, S. F. St. D. ..	Prospect, Bermuda ..	.. ..	h.
Hall, F. W. G., M.B. ..	Dinapore, India	Officer in charge Military Hospital	—
Hayman, S. J. W. ..	Barrackpore, India ..	,, ,, ,, ,,	—
Hennessy, D., M.D. ..	Athlone	,, ,, ,, ,,	—
Hall, R. J. D.	Holywood	,, ,, ,, ,,	—
Hosie, A., M.B.	London	Sanitary Officer, Southern Area, Eastern Command	b.
Holyoake, R.	Northern Command, India	.. ..	—
Hayes, J. P. S.	Dover	Anæsthetist	—
Horrocks, W. H., M.B. ..	Gibraltar	Sanitary Officer	b.
Hale, C. H., D.S.O. ..	Rangoon, India	Officer in charge Military Hospital	—
Hinde, A. B.	S. Africa	.. ..	—
Hore, H. St. G. S. ..	Dublin	.. ..	—
Holt, M. P. C., D.S.O. ..	Woolwich	In charge Surgical Division, Royal Herbert Hospital	—
Hassard, E. M.	Eastern Command ..	.. ..	—
Hallaran, W., M.B. ..	Mian Mir, India ..	.. ..	—
Healey, C. W. R.	Dublin	Officer in charge Isolation Hospital	—
Hardy, F. W., M.B. ..	Cairo, Egypt	Officer in charge Military Hospital, Abbassia, and Sanitary Officer	—
Healy, C. J., M.B. ..	Kandy, Ceylon	Officer in charge Military Hospital	—
Hardy, W. E.	S. Africa	.. ..	—
Hennessy, J., M.B. ..	Returning to England, tour expired	.. ..	—
Hinge, H. A.	Western Command, India	.. ..	—
Innis, B. J.	Fyzabad, India	.. ..	—
Julian, O. R. A., C.M.G...	Northern Command, India	.. ..	b.
Jackson, R. W. H., M.B.	Cork	Sanitary Officer, Cork District ..	b.
Jennings, J. W., D.S.O.	Simla, India	Specialist in Skiagraphy, Eastern Command	o.
Jameson, J. C., M.B. ..	Royal Arsenal, Woolwich	.. ..	b.
Johnson, H. P., M.R.C.P. London	Bareilly, India	.. ..	—
Jones, T. P., M.B. ..	Hong Kong	.. ..	—
Kearney, J., M.D. ..	Wrexham	Officer in charge Military Hospital	—
Kennedy, A.	Belgaum, India	,, ,, ,, ,,	—
Knaggs, H. T., M.B. ..	Dublin	In charge Staff and Depts., North	—
Kelly, J. F. M., M.B. ..	Templemore	Officer in charge Military Hospital	—
Keble, A. E. C.	Chatham	In charge Military Families' Hosp.	h.
Lavie, T. G.	Bellary, India	Officer in charge Military Hospital	—
Le Quesne, F. S., V.C. ..	Lucknow, India	.. ..	—
Leishman, W. B., M.B. (Brevet-Lieut.-Col.)	R.A.M. College, London..	Professor of Pathology	—
Luther, A. J.	Landour, India	Officer in charge Military Hospital	—
Lenehan, T. J., M.B. ..	Potchefstroom, S. Africa..	.. ..	—
Lawson, C.B., M.B. ..	Valetta, Malta	Bacteriologist and Anæsthetist ..	o.
Lewis, R. C.	Chaubuttia, India ..	Officer in charge Military Hospital	—
Longhurst, B. W.. ..	Cyprus	On sick leave	d.
Melville, C. H., M.B. ..	Returning to England, tour expired	.. ..	b.
Mills, B. L., M.D. ..	Poona, India	Staff Officer, Army Bearer Corps, Western Command	b.
Moir, J., M.B.	Landguard..	Officer in charge Military Hospital	—
MacDonald, C. J., M.D...	Fermoy	Anæsthetist and in charge Officers, Women and Children	—
Mathias, H. B., D.S.O. ..	Campbellpore, India ..	Officer in charge Military Hospital	—
Marder, E. S.	Canterbury	.. ..	—
Marks, G. F. H., M.D. ..	Sitapur, India	Officer in charge Military Hospital and Cantonment Hospital	—

Name.	Station.	Appointment.	Specialist Certificates in
Morgan, F. J.	Netley	In charge Surgical Division ..	—
McCulloch, T., M.B. ..	War Office, London ..	Headquarter Staff	—
Macdonald, S., M.B. ..	Woolwich	.. ..	—
Morgan, J. C.	Lebong, India	Officer in charge Military Hospital and Brigade Laboratory	—
Mould, W. T.	Delhi, India	Officer in charge Military Hospital	—
McLoughlin, G. S., M.B., D.S.O.	West African leave ..	.. ..	
Mawhinny, R. J. W. ..	Multan, India	.. ..	—
McDowell, F.	Peshawar, India	.. ..	—
MacCarthy, J. A. O. ..	Kilkenny	Officer in charge Military Hospital	—
Morphew, E. M.	Colchester	Company Officer	—
Mitchell, L. A., M.B. ..	Jubbulpore, India ..	Officer in charge Cantonment Hosp.	--
Martin, C. B., M.B. ..	Straits Settlements ..	.. ..	—
McNaught, J. G., M.D...	Edinburgh	Sanitary Officer	b.
McDermott, T., M.B. ..	Calcutta, India	Specialist in Ophthalmology, Eastern Command	k.
More, L. P., M.B. ..	Sialkot, India	.. ..	—
Moore, G. A., M.D. ..	Warley	Officer in charge Military Hospital	g.
Marder, N.	Netley	.. ..	—
Mansfield, G. S., M.B. ..	St. George's, Bermuda ..	.. ..	—
Mangin, F. M.	Up Park Camp, Jamaica..	Officer in charge Military Hospital	k.
McMunn, J. R.	Pretoria, S. Africa ..	Company Officer	f.
Master, A. E., M.B. ..	Crete	Officer in charge Military Hosp., Kandia	g.
Newland, F. R., M.B. ..	Ahmednagar, India ..	Officer in charge Military Hospital	—
O'Donnell, J. J., M.B. ..	Leeds	,, ,, ,, ,,	—
O'Callaghan, D. M. ..	Norwich	.. ..	—
O'Reilly, H. W. H., M.B.	Wynberg, S. Africa ..	Company Officer	—
Penton, R. H., D.S.O. ..	York	.. ..	—
Poole, W. C., M.B. ..	Returning to England, tour expired	.. ..	b.
Pocock, H. I.	Aldershot	.. ..	—
Paterson, J., M.B. ..	Watford, Bermuda ..	Officer in charge Military Hospital and Army Medical Stores	—
Peeke, H. S.	Aldershot	Company Officer No. 1 Company	—
Parry, H. J., M.B., D.S.O.	Bloemfontein, S. Africa ..	Company Officer	—
Powell, E. E.	Gibraltar	In charge Moorish Castle and Poca Roca	—
Pearse, A.	Chester	Sanitary Officer, Welsh and Midland Command	b.
Porter, F. J. W., D.S.O.	Colchester	.. ..	—
Pilcher, E. M., M.B., F.R.C.S.Eng., D.S.O.	Royal Arsenal, Woolwich	.. ..	j.
Pollock, C. E.	Cottonera, Malta	Officer in charge Military Hospital	e.o.
Prynne, H. V.	Gibraltar	.. ..	k.
Russell, J. J., M.B. ..	Kuldana, India	Officer in charge Military Hospital	—
Raymond, G., M.B. ..	Wellington, India ..	Sanitary Officer, Secunderabad and Burma Divisions	b.
Reily, A. Y., M.B. ..	Maymyo, India	Officer in charge Military Hospital	—
Ritchie, J., M.B.	Tanglin, S. Setts... ..	,, ,, ,, ,,	—
Rawnsley, G. T.	W. Africa	.. ..	—
Reilly, C. W.	Dublin	.. ..	—
Robinson, O. L.	Gibraltar	In charge Windmill Hill	—
Read, H. W. K.	Meiktila, India	Officer in charge Military Hospital	—
Rivers, J. H.	Attached Egyptian Army	.. ..	o.
Saw, F. A., M.D. ..	Secunderbad, India ..	.. ..	b.
Squire, W. P.	Chatham	.. ..	—
Salvage, J. V., M.D. ..	Tidworth	Sanitary Officer, Eastern Area, Southern Command	b.
Saunders, D. M., M.D. ..	Dublin	Assistant to Principal Medical Officer, Irish Command	b.
Scott, G., M.B.	Multan, India	.. ..	—
Scott, B. H.	Murree, India	Sanitary Officer, Northern Command	b.

Name.	Station.	Appointment.	Specialist Certificates in
Stiell, D., M.D.	Thayetmyo, India ..	.. ..	—
Salmon, L. E. A.	Devonport	.. ..	—
Stone, C. A., M.D. ..	Dover	Officer in charge Military Prison	b.
Smith, F., D.S.O. ..	West African leave ..	.. ..	b.
Smithson, A. E., M.B. ..	Chester	.. ..	b.
Shanahan, D. D.	Tipperary	Officer in charge Military Hospital	—
Stalkartt, C. E. G., M.D.	Gosport	.. ..	—
Stanistreet, G. B., M.B. ..	Cairo, Egypt	.. ..	—
Slayter, E. W., M.B. ..	Naini Tal, India	Officer in charge Military Hospital and in charge Headquarter Staff and Establishment	—
Symons, F. A., M.B. ..	Mhow, India	Consulting Surgeon, R.M. Railway	—
Samman, C. T.	Port Royal, Jamaica ..	Officer in charge Military Hospital	n. b.
Spencer, C. G., M.B., F.R.C.S.Eng.	R.A.M. College, London..	Professor of Clinical and Military Surgery	j.
Tatham, C. J. W.	Devonport	Sanitary Officer, Western Area, Southern Command	b.
Trotter, W. J.	Citta Vecchia, Malta ..	Officer in charge Military Hospital	—
Thurston, H. C., C.M.G...	War Office, London ..	Headquarter Staff	—
Thacker, R. C.	Jhansi, India	Officer in charge Military Hospital	—
Thomson, J., M.B. ..	Edinburgh	.. ..	—
Tate, G. W., M.B. ..	Dundalk	Officer in charge Military Hospital	—
Tyacke, N.	Jutogh, India	Officer in charge Military Hospital and Cantonment Hospital	—
Thurston, H. S.	N. China	.. ..	—
Thompson, A. G., M.B. ..	Cardiff	Officer in charge Military Hospital	b.
Taylor, W. J., M.B. ..	Deesa, India	Officer in charge Military Hospital and Station Staff	o.
Tyrrell, A. F.	Gibraltar	.. ..	—
Tibbits, W., M.B. ..	Barrackpore, India ..	.. ..	—
Wilson, J. B., M.D. ..	Alexandria, Egypt ..	Officer in charge Military Hospital	—
Will, J., M.B.	East Africa and Uganda Protectorates	Principal Medical Officer.. ..	—
Wright, R. W.	St. Helena..	Officer in charge Military Hospital	—
Whitty, M. J., M.D. ..	Liverpool	,, ,, Recruiting ..	—
Windle, R. J., M.B. ..	Dublin	In charge Staff and Depts., South	—
Watson, J. J., M.D., C.I.E.	St. George's, Bermuda ..	Officer in charge Military Hospital	—
Whaite, T. Du B., M.B...	Gibraltar	.. ..	—
Watson, A. O. C., M.B. ..	Aberdeen	Officer in charge Military Hospital	b.
Wade, G. A., M.D. ..	Portland	,, ,, ,, ,,	b.
Weir, J. C., M.B.	London	Sanitary Officer, London District	b.
Wright, A...	Portsmouth	.. ..	—
Winter, H. E.	Colaba, India	Offi. in charge Brigade Laboratory	—
Way, L.	Landour, India	.. ..	—
Williams, E. McK. ..	Dover	In charge Section Hospital, Dover Castle	—
Whitestone, C.W. H., M.B.	Hounslow	.. ..	—
Wade-Brown, F. J. ..	London	In charge Kensington Barracks..	—
Withers, S. H., M.B. ..	Benares, India	Officer in charge Military Hospital	—
Williams, E. M.	Valetta, Malta	,, ,, ,, Families' Hospital	h.
Yarr, M. T.	India	Staff of Governor of Bombay ..	—
Young, C. A.	Belfast	.. ..	—

CAPTAINS.

Archer, S. A.	Belfast	Company Officer and Anæsthetist	—
Addams-Williams, L. ..	Standerton, S. Africa ..	Sanitary Officer and Anæsthetist	—
Archer, G. J. S., M.B. ..	Belfast	.. ..	—
Ashe, F.	Dover	In charge Troops, Women and Children	—

Name.	Station.	Appointment.	Specialist Certificates in
Anderson, H. S.	Malta		—
Adye-Curran, W. J. P.	Fermoy		—
Argles, R. L.	R.A.M. College		—
Adderley, A. C.	Wellington, India	Plague Medical Officer	—
Aylen, E. V.	Returning to England, tour expired		—
Adye-Curran, S. M.	,, ,, ,, ,,		—
Boyle, M., M.B.	Shwebo, India	Officer in charge Military Hospital	o.
Buist, John M., M.B.	Pretoria, S. Africa	Sanitary Officer Transvaal	b. c.
Blackham, R. J.	Devonport	Officer in charge Military Families' Hospital	b. h.
Bliss, E. W.	West African leave		j.
Birrell, E. T. F., M.B.	Aldershot		—
Bowen, A. W. N.	Tower Hill, W. Africa		—
Browne-Mason, H. O. B.	Rochester Row, London		—
Berne, J. G.	Nowgong, India		g.
Bourke, E. A.	Londonderry	Officer in charge Military Hospital	b. f.
Brodribb, E.	Gibraltar		—
Barrow, H. P. W.	Returning to England, tour expired		—
Brakenridge, F. J.	Attached Egyptian Army		b.
Blackwell, W. R.	Dublin		—
Butler, S. G.	R.A.M. College		—
Bond, J. H. R.	Bulford		—
Babington, M. H.	Netley	Bacteriologist	—
Buist, James M., M.B.	Northampton		—
Biggam, T., M.B.	Aden		—
Baker, W. L.	Meiktila, India		—
Bennett, W., M.B.	Returning to England, tour expired		—
Bartlett, B. S.	Delhi, India		—
Bennett, E.	Devonport		—
Brown, R. T., M.D.	Lucknow, India	Staff Surgeon and in charge Divisional Laboratory	b.
Bennett, W. L., M.B.	Edinburgh		—
Burke, B. B.	Rawalpindi, India	Officer in charge Cant. Hospital	—
Baillie, G., M.B.	Quetta, India		—
Bodington, P. J., M.B.	Windsor		—
Black, R. B., M.B.	Attached Egyptian Army		—
Brunskill, J. H., M.B.	Thayetmyo, India		—
Bateman, H. R.	London		—
Bransbury, H. A.	Cottonera, Malta		—
Barbour, J. H., M.B.	Returning to England, tour expired		—
Bostock, J. S., M.B.	Crete		—
Beatty, M. C., M.B.	Mhow, India	In charge Brigade Laboratory	—
Carter, J. E., M.B.	Dublin		f.
Campbell, J. H., D.S.O.	Colchester	In charge Military Families' Hosp.	h.
Cochrane, E. W. W., M.B.	Wilberforce, W. Africa	Officer in charge Military Hospital	c.
Clements, R. W., M.B.	Manchester	Adjutant, Manchester Companies R.A.M.C. (Volunteers)	o.
Corkery, M. P.	Portsmouth		—
Clarke, T. H. M., M.B., C.M.G., D.S.O.	Eastern Command, India		—
Cummins, S. L., M.B.	Attached Egyptian Army		—
Carroll, F. F., M.B.	Devonport		j.
Carter, G. B., M.B.	Bangalore, India		—
Collingwood, P. H.	York	Company Officer	—
Crisp, G. B.	Netley		—
Cowan, J., M.B.	R.A.M. College		—
Curme, D. E.	Thayetmyo, India		—
Cunningham, R. A., M.B.	Glencorse	Officer in charge Military Hospital	—
Crawford, V. J.	Queenstown		—
Chopping, A.	R.A.M. College		—
Connolly, E. P.	Belfast		—
Crean, T. J., V.C.	London		—
Cumming, C. C., M.B.	Peshawar		—

Name.	Station.	Appointment.	Specialist Certificates in
Carylon, A. F.	Taunton	Officer in charge Military Hospital	—
Cato, C. S.	Newport	,, ,, ,, ,,	—
Croly, W. C.	Cannanore, India	,, ,, ,, ,,	—
Cotton, F. W.	Returning to England, tour expired		—
Carroll, G.	Dublin		—
Churton, J. G.	Woolwich		—
Cuthbert, J. M., M.B.	Returning to England, tour expired		—
Carr, C. H., M.D.	Quetta, India		—
Crosthwait, W. S.	Secunderabad, India		—
Cautley, J. B.	Returning to England, tour expired		—
Cowey, R. V.	Bangalore, India		—
Clarke, J. B., M.B.	Agra, India		—
Cotterill, L.	Mandalay, India		—
Craig, B. A.	Returning to England, tour expired		—
Delap, G. G., D.S.O.	Millbank, London		—
Douglas, H. E. M., V.C., D.S.O.	Mian Mir, India	In charge Divisional Laboratory	b.
Dinnis, B. R., M.D.	Returning to England, tour expired		—
Dorgan, J., M.B.	Poona, India	In charge Cantonment Hospital	—
Douglass, P. C.	Neemuch, India		—
Duffey, A. C., M.D.	Pretoria, S. Africa	In charge Women and Children's Hospital, Anæsthetist	—
Davidson, H. A., M.B.	Bangalore, India	In charge Brigade Laboratory	b.
Davis, W.	Calcutta, India		—
Evans, P., M.B.	Khartoum, Egypt	Officer in charge Military Hospital	b. f. j.
Ellery, E. E.	Gosport		—
Elsner, O. W. A.	Limerick		—
Ensor, H., M.B., D.S.O.	Attached Egyptian Army		—
Evans, C. R.	Aden		—
Ellery, R. F.	Returning to England, tour expired		—
Fairrie, S. H.	Shorncliffe	Officer in charge Military Families' Hospital	h.
Forrest, J. V., M.B.	West African leave		—
Fuhr, R. S. H., D.S.O.	Rawalpindi, India		—
Fell, M. H. G.	Aldershot	Coy. Offi., No. 2 Coy. R.A.M.C.	—
Falkner, P. H.	Dublin		—
Foster, J. G., M.B.	Port Louis, Mauritius	Officer in charge Military Hospital	—
Ford, E. G., M.B.	York		—
Fawcus, H. B., M.B.	Scarborough		—
Fielding, T. E., M.B.	Southern Command		—
Furnivall, C. H.	Returning to England, tour expired		—
Fitzgerald, Fitz G. G.	R.A.M. College		—
Fry, W. B.	Campbellpore, India		—
Fleming, C. E., M.B.	Returning to England, tour expired		—
Fawcett, R. F. M.	Eastern Command		—
Falkner, M. W.	Muttra, India		—
Foulds, M. F.	Saugor, India		—
Ffrench, E. G., M.B.	Newcastle, Jamaica	Officer in charge Military Hospital	—
Grattan, H. W.	West African leave		b. c.
Gunter, F. E., M.B.	Curragh	Specialist in Operative Surgery	—
Grech, J.	Meerut, India	Specialist in Skiagraphy for Eastern Command	o.
Gwynn, W. P.	R.A.M. College		—
Gallie, J. S.	Bordon	Officer in charge Detention Hosp.	—
Gill, J. G.	R.A.M. College		—
Goddard, G. H.	Eastern Command		—
Goldsmith, G. M., M.B.	Dublin		—
Greenwood, A. R.	Secunderabad, India		—
Goodwin, W. R. P.	Rawalpindi, India	Personal Assistant to Principal Medical Officer Northern Command	—
Gibson, A. W.	Deolali, India	Offi. in charge Cantonment Hosp.	—
Harrison, W. S., M.B.	R.A.M. College		c.

Name.	Station.	Appointment.	Specialist Certificates in
Howell, H. A. L..	Gibraltar	..	f.
Hayes, E. C.	Ceylon	..	b. k.
Hooper, A. W., D.S.O.	Kirkee, India	Officer in charge Military Hospital	—
Hewetson, H.	Dover	..	a. b.
Hudleston, W. E.	Kamptee, India	In charge Station Staff and Brigade Laboratory	b. f.
Hopkins, C. H.	Poona, India	..	f.
Hall, S. O..	St. Thomas' Mount, India	Officer in charge Military Hospital	h.
Heffernan, F. J. C.	Eastern Command, India	..	—
Herrick, H.	Tower Hill, W. Africa	..	—
Hewitt, E. P.	Netley	..	—
Hodgson, J. E.	Calcutta, India	Staff Surgeon, and in charge Departmental Followers' Hospital and Garrison Dispensary	—
Houghton, J. W. H., M.B.	London	..	b.
Harvey, D., M.B..	R.A.M. College, London	Assistant Professor of Pathology	—
Humphrey, L.	Curragh	In charge Military Prison, Company Officer and Anæsthetist	—
Harrison, L. W., M.B.	Sialkot, India	Staff Surgeon	—
Harvey, F..	Deepcut	Officer in charge Detention Hosp.	—
Hime, H. C. R., M.B.	Aldershot	..	—
Hartigan, J. A., M.B.	Aldershot	..	—
Hyde, D. O., M.B.	Karachi, India	In charge Station Staff	—
Hamerton, A. E., D.S.O.	Ferozepore, India	Staff Surgeon	—
Houghton, G. J.	Darjeeling, India	In charge Cantonment Hospital	—
Henderson, P. H., M.B..	Aden	..	—
Hardy, F. H.	R.A.M. College	..	—
Hunt, R. N., M.B.	Secunderabad, India	..	—
Howley, H. E. J. A.	Bermuda	..	—
Hull, A. J..	Jhansi, India	In charge Station Staff	—
Harding, D. L.	Secunderabad, India	..	—
Hyde, P. G., M.B.	Bareilly, India	..	—
Harvey, W. J. S.	Returning to England, tour expired	..	—
Inkson, E. T., V.C.	Woolwich	Adjt., Woolwich Coys. R.A.M.C. (Volunteers)	—
Irvine, F. S., M.B.	Alton	Officer in charge Princess Louise Hospital	—
Irwin, A. W. A.	Returning to England, tour expired	..	—
Jameson, A. D.	Woolwich	..	—
Johnson, J. T., M.D.	Victoria, S. China	..	—
Jones, J. L.	Colombo, Ceylon	..	—
Kiddle, F., M.B..	Ahmednagar, India	In charge Station Staff	k.
Knox, E. B., M.D.	Simla, India	Secretary, Principal Medical Officer His Majesty's Forces in India	—
Kennedy, J. C., M.B.	Valetta, Malta	..	—
Lawson, D.	Netley	Assistant Secretary and Registrar	—
Lowsley, M. M.	Gosport	..	—
Lupton, A. C., M.D.	Newcastle-on-Tyne	..	—
Lauder, T. C., M.B.	Kinsale	..	b.
Leake, J. W.	R.A.M. College	..	—
Lloyd, R. H.	R.A.M. College	..	—
Langstaff, J. W.	Hulme, Manchester	Officer in charge Military Hospital	b.
LLoyd, L. N., D.S.O.	London	Adjutant, London Coys. R.A.M.C. (Volunteers)	—
Lauder, F. P.	Calicut, India	Officer in charge Military Hospital	—
Lelean, P. S.	R.A.M. College	..	—
L'Estrange, E. F. Q.	West African leave	..	—
Lambelle, F. W., M.B.	Returning to England, tour expired	..	—
Long, H. W., M.B.	Jullundur, India	..	—
Milner, A. E.	Simla, India	Staff Officer, Secunderabad and Burma Divisions of the Army Bearer Corps	o.
Morgan, C. K.	Cairo, Egypt	..	o.

Name	Station.	Appointment.	Specialist Certificates in
Maurice, G. T. K. ..	Bareilly, India	.. ..	m.
Morris, A. H.	Sierra Leone, W. Africa..	Sanitary Officer	b. c.
MacDougall, A. J., M.B...	Glasgow	Adjutant, Glasgow Coys. R.A.M.C. (Volunteers)	c.
Marriott, E. W. P. V. ..	Pembroke Dock	.. ..	o.
McKessack, P., M.B. ..	Falmouth	Officer in charge Military Hospital	—
McCarthy, J. McD., M.B.	W. Africa	.. ..	a. b.
Martin, H. G.	Fermoy	Officer in charge Military Families' Hospital	h.
Macpherson, J. D. G., M.B.	Aldershot	Officer commanding "A" Company, Depôt R.A.M.C.	—
Mainprise, C. W... ..	Tidworth	.. ..	—
Morris, J. I. W.	Armagh	Officer in charge Military Hospital	—
MacKenzie, T. C., D.S.O.	R.A.M. College	.. ..	—
Morton, H. M., M.B. ..	Edinburgh	.. ..	—
Matthews, J.	R.A.M. College	.. ..	—
McLoughlin, W. M. ..	Middelburg, Transvaal ..	.. ..	—
Merry, F. H., M.B. ..	Maritzburg, S. Africa ..	Company Officer	—
MacLaughlin, A. M., M.B.	Kildare	.. ..	—
Martin, J. F., M.B. ..	Lower Topa, India ..	Officer in charge Military Hospital	—
McDonnell, E., M.B. ..	Cork	.. ..	—
McLennan, F., M.B. ..	Returning to England, tour	expired	—
Murphy, J. P. J., M.B. ..	Nowshera, India	Officer in charge Cantnt. Hosp...	—
McGrigor, H. J., M.B. ..	R.A.M. College	.. ..	b.
Myles, C. D., M.B. ..	Jubbulpore, India ..	In charge Brigade Laboratory ..	—
Mitchell, A. H. McN. ..	Cawnpore, India	.. ..	—
McMunn, A.	Simla, India	.. ..	—
Nickerson, W. H. S., V.C., M.B.	W. Africa	.. ..	—
Nickerson, G. S., M.B. ..	Attached Egyptian Army	.. ..	—
Norrington, H. L. W. ..	Portsmouth	.. ..	—
Nicholls, H. M., M.B. ..	Kinsale	Officer in charge Military Hospital	—
Norman, H. H.	Queenstown	.. ..	—
O'Grady, S. de C., M.B...	Limerick	Anæsthetist	a.
O'Gorman, C. J., D.S.O...	Maidstone	.. ..	—
O'Flaherty, A. R... ..	Mhow, India	In charge Station Staff	—
Ormsby, G. J. A., M.D. ..	R.A.M. College	.. ..	—
O'Reilly, P. S.	Bordon	.. ..	—
Odlum, W. H.	Nasirabad, India	.. ..	—
O'Donoghue, D. J. F. ..	Belgaum, India	.. ..	—
Profeit, C. W., M.B. ..	Ambala, India	.. ..	g.
Perry, S. J. C. P... ..	West Coast leave	.. ..	o.
Probyn, P. J., D.S.O. ..	St. John's Wood, London	Officer in charge Military Hospital	—
Phillips, R. E. G. ..	R.A.M. College	.. ..	—
Poe, J., M.B.	Newbridge	Officer in charge Military Hospital	—
Penny, F. S., M.B. ..	Mian Mir, India	.. ..	—
Parker, L. E. L.	Woolwich	Bacteriologist	—
Packer, H. D.	R.A.M. College	.. ..	—
Palmer, H. K.	R.A.M. College	.. ..	—
Palmer, F. J.	Dublin	Specialist in Operative Surgery..	j.
Prescott, J. J. W., D.S.O.	Devonport	.. ..	—
Parry, F. M., M.B. ..	Returning to England, tour	expired	—
Powell, J., M.B.	Thobba, India	Officer in charge Military Hospital	—
Purser, L. M., M.B. ..	Returning to England, tour	expired	—
Popham, R. L.	Victoria, B.C.	Officer in charge Military Hospital	—
Power, W. M.	Kamptee, India	.. ..	—
Pinches, H. G.	Lucknow, India	Staff Surgeon	—
Parsons, A. R. C... ..	Imtarfa, Malta	Officer in charge Military Hospital	—
Powell, E. W.	R.A.M. College	.. ..	—
Parkes, E. E., M.B. ..	Gibraltar	.. ..	—
Potter, T. J.	Poona, India	.. ..	—
Riddick, G. B.	India	.. ..	—
Rattray, M. MacG., M.B.	Jhansi, India	.. ..	—

Name.	Station.	Appointment.	Specialist Certificates in
Ross, N. H., M.B. ..	Shorncliffe	.. ..	–
Rutherford, N. J. C., M.B.	London	In charge Chelsea Barracks ..	—
Richards, F. G.	Aldershot	.. ..	—
Roch, H. S.	Longmoor	Officer in charge Military Hospital	—
Robinson, J. H.	Kalabagh, India	,, ,, ,, ,,	—
Ronayne, C. R. L., M.B.	Returning to England, tour expired	.. ..	—
Riach, W., M.D.	Cairo, Egypt	Company Officer, Anæsthetist, and in charge Troops, Citadel	b.
Ryan, E.	Valetta, Malta	.. ..	—
Rowan-Robinson, F. E., M.B.	Belgaum, India	In charge Station Staff and Brigade Laboratory	—
Ritchie, T. F., M.B. ..	Changla Gali, India ..	In charge School of Musketry, and Officer in charge Military Hospital, Khyra Gali	—
Rogers, H., M.B... ..	Dalhousie, India	Officer in charge Cant. Hospital	—
Silver, J. P., M.B. ..	On sick leave	.. ..	—
Sweetnam, S. W... ..	Warley	.. ..	—
Steel, E. B., M.B. ..	Aldershot	Officer comdg. "C" Company, Depôt, R.A.M.C.	n.
Staddon, H. E.	Vocoas, Mauritius.. ..	In charge Effective European Troops and in charge Detention Hospital	—
Smith, L. F., M.B. ..	West Coast leave	.. ..	f.
Statham, J. C. B. ..	Netley	Clinical Pathologist	b. c.
Swabey, M.	Port Lokkoh, West Africa..	Officer in charge Military Hospital	m.
Stammers, G. E. F. ..	Curepipe, Mauritius ..	In charge Effective Troops and Military Families' Hospital	—
Stallard, H. G. F. ..	Attached Egyptian Army	.. ..	—
Selby, R., M.B.	R.A.M. College	.. ..	—
Scott, A. L.	Aldershot	Anæsthetist, Connaught Hospital	—
Sloan, J. M., M.B., D.S.O.	R.A.M. College	.. ..	–
Scarlett, W. W.	Edinburgh	Company Officer	—
Simson, H.	London	In charge Millbank Barracks ..	—
Seeds, A. A., M.D. ..	Middelburg C.C., S. Africa	Company Officer and Anæsthetist	—
Siberry, E. W.	Cork	.. ..	—
Smith, C. S., M.B. ..	Mauritius	.. ..	—
Safford, A. H.	Woolwich	.. ..	—
Sewell, E. P., M.B. ..	Mian Mir, India	Staff-Surgeon	—
Straton, C. H.	Returning to England, tour expired	.. ..	—
Stevenson, T. H., M.B. ..	Fyzabad, India	In charge Cantonment Hospital	—
Spiller, W. M. H., M.B...	Allahabad, India	In charge Brigade Laboratory ..	b.
Shea, H. F., M.B. ..	Bulford	.. ..	—
Stephens, F. A.	Edinburgh	Recr. Duties and in charge Women and Children, Staff and Depts.	—
Steele, W. L.	Lucknow, India	.. ..	—
Sparkes, W. M. B. ..	Amritsar, India	Officer in charge Military Hospital	—
Smith, S. B., M.B. ..	Rawalpindi, India ..	.. ..	—
Skinner, R. McK. ..	Gibraltar	In charge Grand Casemates Bks...	—
Sheehan, G. F.	Returning to England, tour expired	.. ..	—
Sampey, A. W.	W. African leave	.. ..	b.
Thom, G. St. C., M.B. ..	Aldershot	Adjutant, Depôt R.A.M.C. ..	l.
Thorp, A. E.	Fort Tregantle	Officer in charge Troops	—
Taylor, H. S.	West Coast leave	.. ..	—
Tobin, J.	Clonmel	Officer in charge Women & Childr.	—
Thorpe, L. L. G... ..	Aden	.. ..	—
Thomson, C. G.	Enniskillen	Officer in charge Military Hospital	—
Unwin, T. B., M.B. ..	Trincomali, Ceylon ..	,, ,, ,, ,,	
Waring, A. H.	Northern Command, India	.. ..	o.
Ward, W. A.	London	.. ..	—
Wanhill, C. F.	Prospect, Bermuda ..	Sanitary Officer	b. c.
Watts, B.	R.A.M. College	.. ..	—
Weld, A. E.	Curragh	In charge Military Families' Hosp.	h.
Walton, H. B. G. ..	On sick leave	.. ..	—

Name.	Station.	Appointment.	Specialist Certificates in
Winkfield, W. B...	Crownhill Barracks	Officer in charge Troops	—
Wroughton, A. O. B.	Mandalay, India		—
Woodside, W. A.	York		—
Webb, A. L. A	Colchester		—
Winslow, L. F. F.	Gibraltar	In charge Europa Barracks and Anæsthetist	—
Wood, L.	Rawalpindi, India	Staff Surgeon "A"	—
Wingate, B. F.	R.A.M. College		—
Walker, F. S.	Ferozepore, India		—
Waring, A. D., M.B.	On sick leave		—
Weston, A. F.	Sialkot, India	Staff Surgeon	—
Waters, W. J.	Meerut, India		—
Whelan, J. F., M.B.	Peshawar, India		—
West, J. W., M.B.	Bloemfontein, S. Africa		—
White, T.	Crete		—
Worthington, E. S.	Agra, India	In charge Brigade Laboratory	—
Wells, A. J. W.	Maymyo, India		—
Woodley, R. N.	Ghain Tufficha, Malta	Officer in charge N.D. Hospital	—
Winder, J. H. R., M.D.	Forrest, Malta		—
Wilson, R. C.	Cyprus	Officer in charge Military Hospital	—
Williamson, A. J., M.B.	Hyderabad, India		—
Young, A. H. O.	Mullingar		—

LIEUTENANTS.

Ainsworth, R. B.	Secunderabad, India		—
Ahern, D.	Karachi, India		—
Anderson, R. G.	Aldershot		—
Arthur, A. S., M.B.	Cherat, India	Staff Surgeon	—
Ahern, M. D.	Ferozepore, India		—
Anderson, J. A., M.B.	Aldershot	On probation	—
Anthonisz, E. G.	,,	,, ,,	—
Arch, A. J.	,,	,, ,,	—
Balck, C. A. J. A., M.B.	Attock, India	Officer in charge Military Hospital	—
Bagshawe, H. V.	Rangoon, India		—
Browne, W. W.	Rangoon, India	In charge District Laboratory	—
Bell, J. G., M.B.	Belgaum, India		—
Bridges, R. H.	Bangalore, India		—
Brown, G. H. J., M.B.	Mandalay, India		—
Bramhall, C.	Quetta, India	In charge Divisional Laboratory	—
Bradley, C. R.	Poona, India	In charge Cantonment Hospital	—
Bousfield, L., M.B.	Valletta, Malta		—
Bowle, S. C.	Mhow, India		—
Byam, W.	Aldershot	On probation	—
Beadnell, H. O. M.	Northern Command, India		—
Buchanan, R. J. B.	Curragh		—
Booth, E. B., M.B.	Netley		—
Brown, C. G.	Aldershot	On probation	—
Benson, W., M.B.	,,	,, ,,	—
Bryden, R. A.	,,	,, ,,	—
Blackwell, T. S.	,,	,, ,,	—
Crossley, H. J.	Wellington, India	In charge Cantonment Hospital and Staff Surgeon	—
Clarke, F. A. H.	Meerut, India	Staff Surgeon	—
Conway, J. M. H.	Ambala, India	Officer in charge Plague Hospital	—
Coates, T. S., M.B.	Kirkee, India	Officer in charge Cant. Hospital	—
Carmichael, J. C. G., M.B.	St. Thomas's Mount, India		—

Name.	Station.	Appointment.	Specialist Certificates in
Carmichael, D. G., M.B.	Rangoon, India	.. ..	—
Crawford, J. M. M. ..	Dalhousie, India	.. ..	—
Collins, R. T.	Kailand, India	.. ..	—
Cathcart, G. E.	Rawalpindi, India ..	.. ..	—
Cahill, R. J., M.B. ..	Peshawar, India	.. ..	—
Connell, H. B.	.. ..	Seconded with Foreign Office ..	—
Campbell, J., M.B. ..	Eastern Command, India	.. ..	b.
Cordner, R. H. L. ..	Northern ,, ,,	.. ..	—
Carter, H. St. M., M.D..	Aldershot	On probation	—
Churchill, G. B. F. ..	,, ...	.. ..	—
Cromie, M. J.	,, ...	On probation	—
Davidson, P., M.B., D.S.O.	Ghora Dhaka and Kharspur, India	Officer in charge Military Hospital	—
Dawson, F. W. W., M.B.	Middelburg, C.C., S. Africa	.. ..	—
Dunbar, B. H. V. ..	Purandhar, India ..	.. ..	—
Duguid, J. H., M.B. ..	Tanglin, S. Setts.	.. ..	—
Dudding, T. S.	Bloemfontein, S. Africa ..	.. ..	—
Dunkerton, N. E. ..	Potchefstroom, S. Africa..	.. ..	—
Douglass, J. H., M.D. ..	Madras, India	.. ..	—
Dwyer, P., M.B.	Cork	.. ..	—
Davy, P. C. T., M.B. ..	Mabanta, W. Africa ..	Officer in charge Military Hosp.	—
Doig, K. A. C.	Eastern Command, India	.. ..	—
Dunne, J. S.	Aldershot	On probation	—
Ellis, W. F.	Multan, India	Staff Surgeon	—
Emerson, H. H. A., M.B.	Aldershot	On probation	—
Foster, R. L. V., M.B. ..	Egypt	.. ..	—
Franklin, R. J.	Benares, India	.. ..	—
Fawcett, H. H. J. ..	Harrismith, South Africa	Sanitary Officer	—
Fairbairn, J., M.B. ..	Colaba, India	.. ..	—
Fraser, A. N., M.B. ..	N. China	.. ..	—
Frost, A. T.	Hong Kong	.. ..	—
Ferguson, G. E.	Aldershot	On probation	—
Fawcett, C. E. W. S., M.B.	,, ...	,, ,, ...	—
Farrant, P.	,, ...	,, ,, ...	—
Gatt, J. E. H., M.D. ..	Middelburg, Transvaal, South Africa	.. ..	—
Gray, A. C. H., M.B. ..	Uganda, East Africa ..	Seconded with Foreign Office ..	—
Glanvill, E. M., M.B. ..	Barberton, South Africa	Officer in charge Military Hospital	—
Grant, M. F.	Colaba, India	.. ..	—
Garland, F. J., M.B. ..	Ahmednagar, India ..	.. ..	—
Gater, A. W.	Northern Command, India	.. ..	—
Gibbon, T. H., M.D. ..	London District	.. ..	—
Graham, J. H., M.B. ..	Aldershot	On probation	—
Hayes, A. H.	Ambala, India	.. ..	—
Harding, N. E. J., M.B..	Bhamo, India	.. ..	
Holden, C. W.	West Coast leave	.. ..	—
Harty, T. E.	Calcutta, India	.. ..	—
Hughes, G. W. G. ..	Egypt	Attached Egyptian Army ..	—
Harvey, N. D'E., M.B. ..	Wynberg, S. Africa ..	Anæsthetist	—
Hanafin, P. J.	Pretoria, S. Africa ..	.. ..	—
Hildreth, H. C.	Madras, India	In charge Fort Dispensary and Brigade Laboratory	—
Hole, R. B., M.B. ..	Khandalla, India.. ..	Officer in charge Military Hospital	—
Harding, H., M.B. ..	Karachi, India	.. ..	—
Hayes, G. S. C.	Khanspur, India	.. ..	—
Hills, W. H., M.B. ..	Eastern Command, India	.. ..	—
Hallowes, R. C., M.B. ..	Alexandria, Egypt ..	In charge Mustapha	—
Harvey, G. A. D.	Straits Settlements ..	.. ..	—
Heron, G. W.	Aldershot	.. ..	—
Hoar, J. E.	Alton	Anæsthetist Princess Louise Hospital	—
Holbrooke, C. D. M. ..	Netley	.. ..	—
Humfrey, R. E.	Western Command, India	.. ..	—

Name.	Station.	Appointment.	Specialist Certificates in
Hastings, A. E. F.	Aldershot	On probation	—
Ievers, O., M.B.	St. Helena		—
Irvine, A. E. S.	Aldershot	On probation	—
Johnstone, D. P.	Bangalore, India		—
Jones, P. A.	Tidworth		—
Kelly, W. D. C., M.B.	Rawalpindi, India		—
Kelly, H. B., M.B.	Bangalore, India		—
Kempthorne, G. A.	Mian Mir, India		—
Keane, M.	,,	,, ,,	—
Lambert, F. C.	Pretoria, S. Africa		—
Lewis, S. E., M.B.	,, ,,		—
Lewis, R. R.	Bellary, India		—
Le Bas, D.	Bloemfontein, S. Africa		—
Lucas, T. C.	Kirkee, India		—
Luxmoore, E. J. H.	India		—
Low, N.	St. Thomas' Mount, India		—
Lynch, J. P.	Eastern Command, India		—
Lithgow, E. G. R.	S. Africa		—
Lewis, R. P.	Aldershot	On probation	—
McKenzie, J., M.B.	Dinapore, India	Officer in charge Cant. Hospital	—
Meadows, S. M. W.	Murree, India	In charge Military Family Hospital, Cliffden	—
Meldon, J. B.	Malapuram, India	Officer in charge Military Hospital	—
MacNicol, R. H., M.B.	Secunderabad, India		—
McEntire, J. T., M.B.	Bloemfontein, S. Africa		—
Mackay, G. S., M.B.	Pretoria, S. Africa		—
MacDowell, W. MacD.	Mhow, India		—
Moore, E. H. M.	Middelburg, C. Colony		—
Meaden, A. A.	Mhow, India		—
Mackenzie, J. F. C., M.B.	Eastern Command, India		—
Millar, C. R.	Ceylon		—
Maughan, J. St. A.	Bulford		—
Meredith, R. G., M.B.	Birr	Officer in charge Military Hospital	—
McNeight, A. A., M.B.	Dublin	Anæsthetist	—
Maydon, W. G., M.B.	Eastern Command, India		—
Moriarty, T. B.	Aldershot	On probation	—
Moss, E. L.	,,	,, ,,	—
McConaghy, W., M.B.	,,	,, ,,	—
Marett, P. J.	,,	,, ,,	—
Noke, F. H.	Poona, India		—
Nealor, W. S.	Aldershot		—
Nash, R. P.	Woolwich		—
Nimmo, W. C.	Aldershot	On probation	—
Ommanney, F. M. M.		Seconded with Colonial Office	—
Osburn, A. C.	Agra, India		—
Otway, A. L., M.B.	Nasirabad, India	In charge Cantonment Hospital	—
O'Brien, C. W.	Netley		—
Ormrod, G., M.B.	Eastern Command, India		—
O'Carroll, A. D., M.B.	Aldershot	On probation	—
Pennefather, E. M.	Secunderabad, India		—
Patch, B. G.	Dagshai, India		—
Powell, J. E.	Ranikhet, India	In charge Cantonment Hospital and Civil Surgeon	—
Pallant, S. L.	Jubbulpore, India		—
Painton, G. R.	Colchester		—
Parsons, W.	Netley		—
Power, P., M.B.	Jamaica		—
Pascoe, J. S.	Egypt		—
Potts, E. T., M.D.	Aldershot	On probation	—
Priestley, H. E.	,,	,, ,,	—
Reed, G. A. K. H.	Jhansi, India		—
Rutherford, R., M.B.	Deolali, India		—
Ranking, R. M.	Victoria, S. China	In charge Hospital Ship "Meeanee"	—

Name.	Station.	Appointment.	Specialist Certificates in
Richmond, J. D., M.B.	Quetta, India	In charge Station Staff	—
Rugg, G. F.	Attached Egyptian Army		—
Ryley, C.	Hong Kong		b.
Russell, H. W., M.D.	Jamaica		—
Richard, G. H.	Eastern Command, India		—
Roberts, F. E.	Aldershot		—
Rahilly, J. M. B., M.B.	"	On probation	—
Rose, A. M., M.B.	"	" "	—
Rees, G. H., M.B.	"	" "	—
Ritchie, M. B. H., M.B.	"	" "	—
Smallman, A. B., M.B.	Lebong, India	Special duty with 2nd Royal Fusiliers	—
Storrs, R.	Subathu, India	Officer in charge Cantonment Hospital	—
Seccombe, J. W. S.	Devonport		—
Skelton, D. S.	Colombo, Ceylon		—
Stanley, C. V. B., M.D.	Chatham		—
Swanzy, H. H.	Cawnpore, India	In charge Departmental Followers' Hospital, Harness Factory, and Cantonment Hospital	—
Stack, H. T., M.B.	Naini Tal, India		—
Sinclair, M., M.B.	Edinburgh		—
Sidgwick, H. C., M.B.	Jamaica		—
Sherran, H. G.	Aldershot	On probation	—
Scatchard, T.	"	" "	—
Symons, V. H.	"	" "	—
Sampson, F. C., M.B.	"	" "	—
Smyth, R. S., M.B.	"	" "	—
Stewart, H. C., M.B.	"	" "	—
Tyndale, W. F., M.B., C.M.G.	Calcutta, India		—
Tulloch, F. M. G.	Uganda	Seconded with Colonial Office	—
Turner, F. J.	Sialkot, India	Staff Surgeon	—
Thomson, D. S. B., M.B.	Attached Egyptian Army		—
Turner, C. H.	Sialkot, India		—
Turnbull, J. A.	Ghora Dhaka and Khanspur, India		—
Thurston, L. V.	Western Command, India		—
Thomson, C. P., M.D.	Aldershot	Anæsthetist, Cambridge Hospital	—
Thompson, R. J. C.	Curragh		—
Tabuteau, G. G.	Western Command, India		—
Vaughan, W. F. H.	Bellary, India		—
Vidal, A. C.	Aldershot	On probation	—
Walker, N. D., M.B.	Quetta, India		—
Webb, H. G. S.	Upper Topa, India		—
Winder, M. G.	Potchefstroom, S. Africa	Company and Sanitary Officer	—
Wood, A. E. B., M.B.	Allahabad, India		—
Webster, J. A. W.	Secunderabad, India	In charge Cantonment Dispensary, Trimulgherry, and Mil. Prison	—
Wilmot, R. C.	Rangoon, India		—
Watson, D. P., M.B.	Karachi, India	In charge Brigade Laboratory	—
Wetherell, M. C., M.B.	Rawalpindi, India		—
Wright, T. J.	Wellington, India	In charge Cordite Fact., Arvankad	b.
Whitehead, E. C., M.B.	Middelburg, C. Colony		—
Wiley, W., M.B.	Bangalore, India		—
Wilson, H. T.	Northern Command, India		—
Winckworth, H. C.	Valletta, Malta		—
Wallace, G. S., M.B.	Mauritius		—
Weston, W. J.	Aldershot	On probation	—
Ware, G. W. W., M.B.	"	" "	—
White, C. F., M.B.	"	" "	—
Wyatt, C. J., M.B.	"	" "	—

MEDICAL OFFICERS OF THE HOUSEHOLD CAVALRY.

Rank.	Name.	Regiment.	Station.	Specialist Certificates in
Surg.-Lieutenant-Colonel	Deeble, B. W. C. ..	1st Life Guards ..	Regent's Park	—
Surgeon-Major	Power, J. H.	2nd Life Guards ..	Windsor ..	—
,, ,, ...	Rayner, H., M.B. ..	Royal Horse Guards ..	Hyde Park ..	—
Surgeon-Captain ..	Cowie, R. M.	2nd Life Guards ..	Windsor ..	—
,, ,, ...	Killery, St. J. B. ..	Royal Horse Guards ..	Hyde Park ..	—
,, ,, ...	Pares, B.	1st Life Guards ..	Regent's Park	—

MEDICAL OFFICERS OF THE BRIGADE OF GUARDS.

Rank.	Name.	Regiment.	Station.	Specialist Certificates in
Brig.-Surg.-Lieut.-Col. ..	Harrison, C. E., M.B.	Grenadier Guards ..	Millbank, London	—
Surg.-Lieutenant-Colonel	Crooke-Lawless, W. R., M.D.	Coldstream Guards ..	On Staff of Viceroy of India	—
,, ,, ,,	Bateson, J. F., M.B. ..	,, ,, ..	London ..	—
,, ,, ,,	Sheldrake, E. N. ..	Grenadier Guards ..	,, ..	—
Surgeon-Major	Moores, S. G.	Scots Guards	Aldershot ..	b.
,, ,, ...	Whiston, P. H. ..	Irish Guards	,, ..	b.

QUARTERMASTERS.

Rank.	Name.	Dates of Birth.	Dates of Promotion to present rank.	Present Station.	Date of last arrival home or embarkation for Abroad.
Hon. Major ..	Merritt, G. ..	23 6 1856	10 7 1889 Hon. Major 10 7 1904	Cape Town, S. Africa	24 12 1904
,, ,, ..	Beach, J. H. W.	9 9 1857	8 1 1890 ,, ,, 8 1 1905	London ..	2 5 1903
,, ,, ..	Thowless, E. ..	5 4 1851	24 12 1890 ,, ,, 24 12 1905	Woolwich ..	7 12 1902
,, Captain	Hirst, J. ..	23 2 1856	4 2 1891 Hon. Capt. 4 2 1901	Portsmouth ..	31 8 1902
,, ,, ..	Goater, B. ..	9 10 1854	23 12 1891 ,, ,, 23 12 1901	Chester ..	5 7 1903
,, ,, ..	Lockhart, H. ..	6 8 1853	16 3 1892 ,, ,, 16 3 1902	Dublin ..	24 5 1903
,, ,, ..	Bere, C. ..	1 2 1852	11 1 1893 ,, ,, 11 1 1903	London ..	10 10 1902
,, ,, ..	Lines, E. ..	16 5 1855	4 10 1893 ,, ,, 4 10 1903	Malta ..	9 7 1902
,, ,, ..	Crawley, C. ..	7 5 1855	8 8 1894 ,, ,, 8 8 1904	Egypt ..	15 5 1903
,, ,, ..	Brake, T. F. ..	18 2 1859	5 9 1894 ,, ,, 5 9 1904	Dublin ..	23 5 1902
,, ,, ..	Short, J. B. ..	13 2 1860	12 9 1894 ,, ,, 29 11 1900	Wynberg, S. Africa	21 10 1899
,, ,, ..	Hasell, H. G. ..	23 8 1860	17 4 1895 ,, ,, 17 4 1905	Canterbury ..	14 12 1902
,, Lieut. ..	Matthews, J. ..	22 8 1855	25 3 1896	Returning to England, tour expired	
,, ,, ..	Finley, A. ..	18 3 1853	6 5 1896	Aldershot ..	9 11 1902
,, ,, ..	Diggins, W. J. ..	26 8 1854	3 6 1896	Returning to England, tour expired	

Rank.	Name.	Dates of Birth.	Dates of Promotion to present rank.	Present Station.	Date of last arrival home or embarkation for Abroad.
Hon. Lieut...	Allen, G. L. ..	25 5 1856	9 6 1897	Malta ..	19 2 1903
,, Captain	Bruce, A. ..	4 8 1858	24 11 1897	Woolwich ..	13 2 1904
			Hon. Capt. 22 8 1902		
,, Lieut...	Macintosh, P...	12 10 1854	24 8 1898	Edinburgh ..	13 9 1902
,, ,, ..	Hawkey, R. ..	12 9 1854	28 12 1898	Woolwich ..	16 11 1902
,, ,, ..	Whitehorn, J., C.B.	27 2 1856	8 3 1899	Cork	24 3 1903
,, ,, ..	Painton, G. H.	5 7 1855	24 6 1899	Depôt ..	10 9 1902
,, ,, ..	[1]Brook, H. S. ..	13 7 1856	12 7 1899	S. Africa ..	22 9 1899
Hon. Lieut...	Spackman, H...	11 6 1860	4 10 1899	S: Africa ..	17 11 1905
,, ,, ..	Chalk, A. J. ..	1 3 1861	18 11 1899	Dover ..	23 11 1902
,, ,, ..	Green, J. ..	23 12 1859	18 11 1899	Devonport ..	21 6 1902
,, ,, ..	Talbot, W. J. C.	25 10 1857	18 11 1899	York	28 12 1902
,, ,, ..	Moss, E. P. ..	11 4 1859	18 11 1899	Southampton	23 9 1905
,, ,, ..	Essex, B. E. ..	2 6 1860	6 12 1899	Colchester ..	9 9 1902
,, ,, ..	McClay, J. ..	20 9 1858	6 12 1899	Dover ..	31 1 1905
,, ,, ..	Short, G. F. ..	5 4 1862	6 12 1899	N. China ..	8 7 1904
,, ,, ..	Woolley, H. ..	28 1 1864	13 12 1899	Gibraltar ..	12 11 1902
,, ,, ..	Glennon, J. ..	10 6 1859	13 12 1899	Belfast ..	4 10 1902
,, ,, ..	Ferguson, J. ..	10 12 1859	3 1 1900	S. Africa ..	
,, ,, ..	Hall, F. W. ..	26 4 1859	3 1 1900	Aldershot ..	7 12 1902
,, ,, ..	Morrison, A. ..	16 5 1860	3 1 1900	Bloemfontein, S. Africa	22 9 1904
,, ,, ..	Attwood, J. ..	16 12 1862	24 1 1900	Bulford ..	13 12 1902
,, ,, ..	Duncan, W. ..	22 4 1859	24 1 1900	Netley ..	18 9 1902
,, ,, ..	Roberts, R. O...	12 9 1858	24 1 1900	Middelburg C.C., S. Africa	24 12 1904
,, ,, ..	[2]Bruce, F. ..	29 1 1859	3 2 1900	Dublin ..	19 11 1900
,, ,, ..	Holway, W. G.	8 11 1859	3 2 1900	Middelburg, Transvaal, S. Africa	22 9 1904
,, ,, ..	Offord, E. P. ..	3 5 1862	3 2 1900	Gosport ..	9 9 1902
,, ,, ..	Audus, H. J. F.	17 6 1860	3 2 1900	Alton.. ..	11 3 1900
,, ,, ..	Conolly, J. B...	7 8 1864	7 3 1900	Netley ..	10 9 1902
,, ,, ..	Houghton, E...	17 6 1859	17 3 1900	Belfast ..	7 12 1902
,, ,, ..	Scott, R. ..	5 11 1859	17 3 1900	Malta ..	15 10 1902
,, ,, ..	Wilson, A. ..	15 9 1864	17 3 1900	Hong Kong ..	2 11 1904
,, ,, ..	Glover, H. W.	10 2 1860	17 3 1900	Aldershot ..	6 5 1901
,, ,, ..	Exton, T. ..	11 8 1860	23 5 1900	,, ..	30 8 1902
,, Captain	Crookes, F. ..	26 11 1861	23 5 1900	Devonport ..	10 12 1904
			Hon. Capt. 29 11 1900		
,, Lieut...	Cowan, R. R. ..	29 5 1862	30 5 1900	Shorncliffe ..	19 12 1903
,, ,, ..	Benson, G. A...	19 12 1862	2 6 1900	Curragh ..	16 4 1905
,, ,, ..	Jacomb, T. J. ..	16 4 1861	2 6 1900	Chatham ..	18 3 1902
,, ,, ..	Wakefield, H. P.	11 2 1862	23 6 1900	Bulford ..	16 4 1905
,, ,, ..	Wheeler, A. ..	1 4 1862	26 6 1900	Depôt ..	10 2 1905
,, ,, ..	Pilgrim, A. J. ..	23 6 1860	15 8 1900	London ..	31 8 1902
,, ,, ..	Lunney, A. ..	7 1 1864	16 2 1901	Portsmouth ..	10 2 1905
,, ,, ..	Clapshaw, A. ..	3 9 1859	13 3 1901	York	2 10 1902
,, ,, ..	Archibald, W. N.	8 9 1861	13 3 1901	Egypt ..	9 4 1903
,, ,, ..	Watkins, J. ..	29 5 1860	13 3 1901	Chester ..	16 4 1905
,, ,, ..	Gillman, J. ..	28 11 1862	11 1 1902	Netley ..	16 4 1905
,, ,, ..	Cope, T. F. ..	14 11 1861	11 1 1902	Pretoria, S. Africa	11 1 1902

[1] Seconded with Transvaal Medical Staff.
[2] Specialist Certificate in Skiagraphy.